



Account of monetary policy

2015

Account of monetary policy 2015

The Riksbank is an authority under the Riksdag, the Swedish Parliament, with responsibility for monetary policy in Sweden. Since 1999, the Riksbank has had an independent position with regard to the Riksdag and the Government. This means that the six members of the Executive Board decide on monetary policy issues without seeking or taking instructions. Nor may any other authority determine how the Riksbank should decide on issues concerning monetary policy.

The way in which the Riksbank carries out the delegated task is followed up in various ways by the Riksdag. For instance, every year the Riksdag Committee on Finance examines whether the General Council of the Riksbank and the Executive Board can be discharged from liability for their administration during the past year. Every year, the Riksdag Committee on Finance also examines and assesses the monetary policy conducted by the Riksbank during the preceding years. The Riksbank compiles and publishes material for this assessment.

The material compiled by the Riksbank is thus a basis for assessment – not an assessment in itself. On the other hand, this does not mean that it is a pure compilation of figures. The account also includes analyses of outcomes, forecasts and events as the Riksbank believes that those who evaluate monetary policy should have access to the Riksbank's interpretation of the material. It is then up to the Committee on Finance, and others who wish to assess the material, to concur with the Riksbank's conclusions or to make another interpretation.

The main features of the report are summarised in Chapter 1. Chapter 2 examines target attainment in 2015, while Chapter 3 gives an account of the monetary policy conducted over the year. Chapter 4 analyses the accuracy of the forecasts. The report also contains two articles – one on the Riksbank's development work in 2015 and one on whether the Riksbank has given sufficient consideration to Sweden's international dependence in its forecasts.

This publication was previously named Material for assessing monetary policy. The Account of Monetary Policy in 2015 is available, like the previous reports, on the Riksbank's website www.riksbank.se.

Monetary policy in Sweden

MONETARY POLICY STRATEGY

- According to the Sveriges Riksbank Act, the objective for monetary policy is to maintain price stability. The Riksbank has specified this as a target for inflation, according to which the annual change in the consumer price index (CPI) is to be 2 per cent.
- At the same time as monetary policy is aimed at attaining the inflation target, it is also to support the objectives of general economic policy for the purpose of attaining sustainable growth and a high level of employment. This is achieved through the Riksbank, in addition to stabilising inflation around the inflation target, endeavouring to stabilise production and employment around paths that are sustainable in the long term. The Riksbank therefore conducts what is generally referred to as flexible inflation targeting. This does not mean that the Riksbank neglects the fact that the inflation target is the overriding objective.
- It takes time before monetary policy has a full impact on inflation and the real economy. Monetary policy is therefore guided by forecasts for economic developments. The Riksbank publishes its own assessment of the future path for the repo rate. This repo-rate path is a forecast, not a promise.
- In connection with every monetary policy decision, the Executive Board makes an assessment of the repo-rate path needed, and any potential supplementary measures necessary, for monetary policy to be well-balanced. It thus normally a question of finding an appropriate balance between stabilising inflation around the inflation target and stabilising the real economy.
- There is no general answer to the question of how quickly the Riksbank aims to bring the inflation rate back to 2 per cent if it deviates from the target. A rapid return may in some situations have undesirable effects on production and employment, while a slow return may have a negative effect on confidence in the inflation target. The Riksbank's ambition has generally been to adjust monetary policy so that inflation is expected to be fairly close to the target in two years' time.
- According to the Sveriges Riksbank Act, the Riksbank's tasks also include promoting a safe and efficient payment system. Risks linked to developments in the financial markets are taken into account in the monetary policy decisions. With regard to preventing an imbalance in asset prices and indebtedness, the most important factors, however, are effective regulation and supervision. Monetary policy only acts as a complement to these.
- In some situations, as in the financial crisis 2008–2009, the repo rate and the repo-rate path may need to be supplemented with other measures to promote financial stability and ensure that monetary policy is effective.
- The Riksbank endeavours to ensure that its communication is open, factual, comprehensible and up-to-date. This makes it easier for economic agents to make good economic decisions. It also makes it easier to evaluate monetary policy.

DECISION-MAKING PROCESS

The Executive Board of the Riksbank usually holds six monetary policy meetings per year at which it decides on monetary policy. A Monetary Policy Report is published in connection with these meetings. Approximately two weeks after each monetary policy meeting, the Riksbank publishes minutes from the meeting, in which it is possible to follow the discussion that led to the current decision and to see the arguments put forward by the different Executive Board members.

PRESENTATION OF THE MONETARY POLICY DECISION

The monetary policy decision is presented in a press release at 9.30 a.m. on the day following the monetary policy meeting. The press release also states how the individual Executive Board members voted and provides the main motivation for any reservations entered. A press conference is held on the day following the monetary policy meeting.

Contents

- Chapter 1 – Summary **5**
 - Article: The Riksbank's development work 2015 **8**
- Chapter 2 – Target attainment **13**
- Chapter 3 – Monetary policy 2015 **25**
- Chapter 4 – Forecasting performance **35**
 - Article: Does the Riksbank sufficiently take into account Sweden's international dependence in its forecasts? **41**
- Appendix **45**

Chapter 1 – Summary

At the beginning of 2015, inflation was still very low and inflation expectations fell in a worrying manner. The Riksbank continued to conduct a clearly expansionary monetary policy to uphold confidence in the inflation target as a benchmark for price-setting and wage formation. During 2015 the repo rate was cut by a total of 0.35 percentage points and the Riksbank began buying government bonds on a large scale. In the light of the expansionary policy, economic activity continued to improve. Growth was high, unemployment fell and resource utilisation rose and approached a normal level. Inflation also rose and inflation expectations started to increase in the short run, and stabilised in the long run. The expansionary monetary policy conducted in recent years thus appears to have had an effect. However, both the Riksbank and other analysts overestimated inflation in 2015 in their forecasts. For instance, unexpectedly low energy prices held back inflation in Sweden and abroad. As monetary policy needs to be expansionary, it becomes even more important to take measures in other policy areas to create a more efficient housing market and to reduce the risks linked to household indebtedness.

Continued economic improvement and rising inflation in 2015

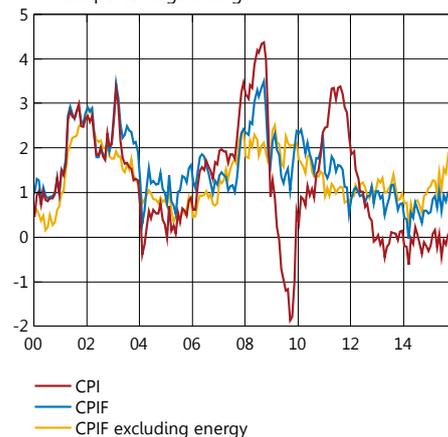
Growth in Sweden was good in 2015. GDP increased by 4.1 per cent, which was high from both an international and an historical perspective. Various measures of resource utilisation in the economy continued to rise and were close to normal levels at the end of the year. As economic activity strengthened, the labour market situation also improved. The number of employed, which has shown a trend increase since the financial crisis, continued to rise. At the same time, the increase in the labour force slowed down. The combination of the higher employment and the slower rate of increase in the labour force contributed to unemployment falling from 7.9 to 7.4 per cent.

Inflation was higher in 2015 than in 2014 (see Figure 1:1). However, it was held back by falling energy prices and the direct effects on household mortgage rates of the Riksbank's repo-rate cuts. If energy prices and direct interest rate effects are excluded, inflation was 1.4 per cent (CPIF excluding energy), which can be compared with 0.7 per cent in 2014. If only the interest rate effects are excluded, CPIF inflation was 0.9 per cent, while CPI inflation was 0.0 per cent. The corresponding figures for 2014 were 0.5 and -0.2 per cent respectively. Inflation expectations also showed an upturn at 1 and 2 years ahead and expectations for 5 years ahead stabilised (see Figure 1:2). The expansionary monetary policy in recent years has thus begun to contribute to higher inflation, although the stimulus effects on developments in the real economy are even more apparent.

Higher growth than expected but lower inflation

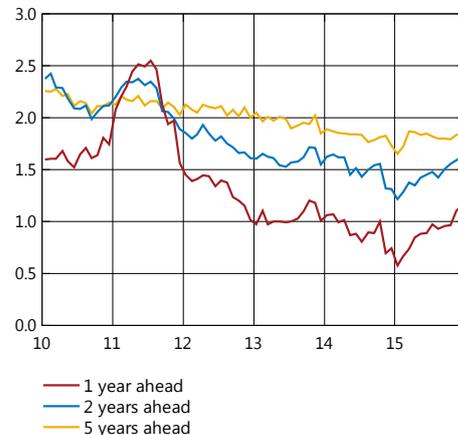
Economic activity in 2015 was stronger than the Riksbank forecast in 2014 (see Figure 1:3). At the same time, inflation was overestimated, even if the forecasts made at the end of 2014 captured relatively well the upturn that occurred if one disregards the direct effects of the repo-rate cuts (see Figure 1:4).

Figure 1:1. Development of inflation
Annual percentage change



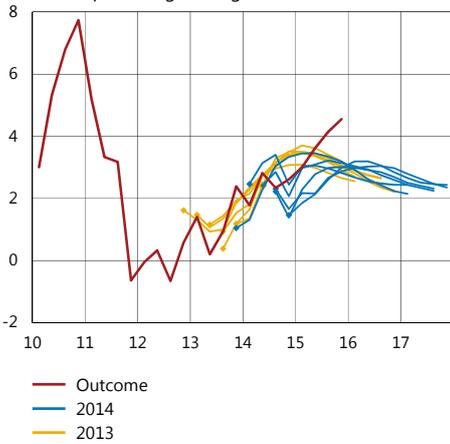
Note. The CPIF is the CPI with a fixed mortgage rate.
Source: Statistics Sweden

Figure 1:2. Inflation expectations among money market participants
Per cent



Source: TNS Sifo Prospera

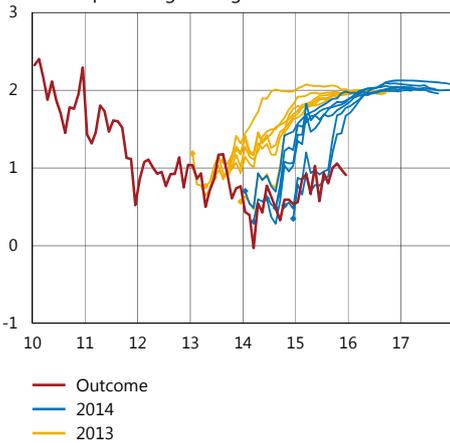
Figure 1.3. GDP, outcome and forecasts
Annual percentage change



Note. The yellow and blue lines represent the Riksbank's forecasts 2013–2014. The marks show the starting point of each forecast and may therefore deviate from the latest outcome at that point in time.

Sources: Statistics Sweden and the Riksbank

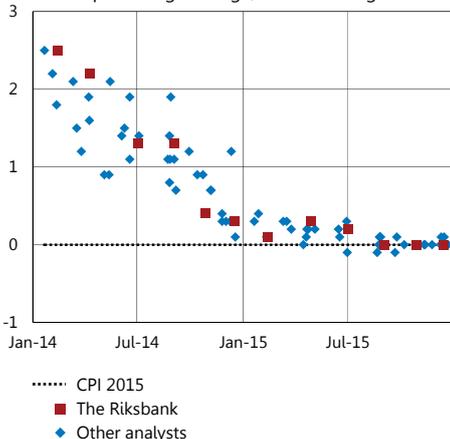
Figure 1.4. CPIF, outcome and forecasts
Annual percentage change



Note. See the note to Figure 1.3. The CPIF is the CPI with a fixed mortgage rate.

Sources: Statistics Sweden and the Riksbank

Figure 1.5. Forecasts 2014 and 2015 for CPI inflation in 2015
Annual percentage change, annual averages



Note. Other analysts refer to the Confederation of Swedish Enterprise, HUI Research AB, the Ministry of Finance, the National Institute of Economic Research, Nordea, SEB, Svenska Handelsbanken, Swedbank and the Swedish Trade Union Confederation (LO).

Sources: Respective analysts, Statistics Sweden and the Riksbank

Low inflation that undershoots the central banks' inflation targets is to a large degree an international phenomenon. One important explanation is that energy prices have fallen more than expected. For example, the oil price fell by more than 50 per cent from the middle of 2014 to the end of 2015. The generally low international inflation has held back import prices. However, the weak inflationary impulses from abroad have to some extent been counteracted by the weaker than expected krona.

■ **Analysts continued to overestimate inflation**

The Riksbank was not alone in overestimating inflation. Over a number of years, analysts of the Swedish economy have tended to initially make forecasts of inflation that are too high and then been forced to adjust them downwards. This pattern continued in 2015, which is particularly clear with regard to CPI inflation, although CPIF inflation was also overestimated in the forecasts made in 2014 (see Figures 1:5 and 1:6).

On the other hand, real economic activity was stronger than most analysts had expected. The forecasts for GDP growth in 2015 were lower throughout than the outcomes (see Figure 1:7).

An assessment of the forecasts over a longer period, 2007–2015, shows that the differences between the various analysts' forecasting performance are minor and on the whole not statistically significant. The Riksbank has succeeded less well in predicting the development of its own policy variable, the repo rate. This is of course not very satisfactory, but at the same time shows that the Riksbank has been prepared to reconsider its assessments and to adapt monetary policy when necessary. On the other hand, the Riksbank's forecasts of, for instance, GDP growth are relatively good in comparison with others.

Continued expansionary monetary policy in 2015

An increasingly long period with inflation below the target and falling inflation expectations has meant that the Executive Board of the Riksbank has assessed that it is essential to bring inflation quickly up to the target of 2 per cent. There is a risk that continued low inflation will lead to inflation expectations falling further and to confidence in the inflation target as a benchmark for price-setting and wage formation weakening. If inflation and inflation expectations, and thereby also the average repo rate, become entrenched at an excessively low level, it could make it more difficult for the Riksbank to cut the repo rate sufficiently to counteract economic downturns in the future. These considerations also characterised the monetary policy conducted in 2015.

The Riksbank cut the repo rate in February, March and July by a total of 0.35 percentage points, from 0 to –0.35 per cent. To make monetary policy even more expansionary and to provide further support to the upturn in inflation, the Riksbank also decided to buy government bonds to a total nominal value of SEK 200 billion.

The low inflation was a central topic of the Executive Board's discussion in 2015. One particular aspect was that the Riksbank needed to take into account the fact that monetary policy was very expansionary in many other countries. Large differences between monetary policy in Sweden and that in other countries could lead to a rapid appreciation of the krona, which in turn could comprise an obstacle to the upturn in inflation. A rapid appreciation of the krona could also have clearly negative consequences for the real economy. A particularly important period in this context was around the end of February/beginning of March, when the krona appreciated substantially in connection with the ECB beginning its large-scale asset purchases.

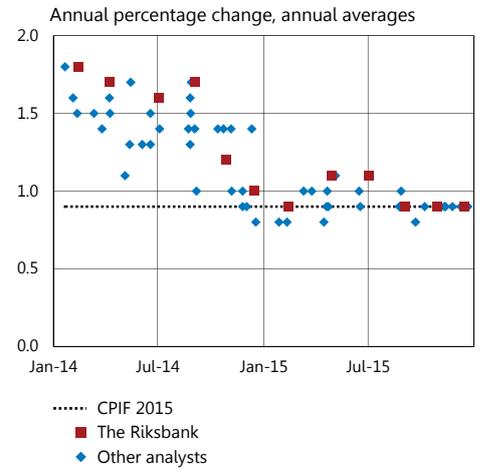
The discussions also concerned how well the rather unusual monetary policy measures would work. Both the negative policy rate and the large purchases of bonds are unique in historical terms. The Executive Board's conclusion was that cutting the repo rate to negative levels had functioned largely as expected, with a largely normal impact, and that the purchases of government bonds had had an effect.

The high level of household indebtedness and the rising housing prices have been recurring topics for discussion in recent years. The Executive Board observed that as monetary policy needs to be clearly expansionary to maintain confidence in the inflation target, it is even more important to take measures in other policy areas, both to create a more efficient housing market and to reduce the risk of household indebtedness causing problems further ahead for growth and financial stability.

The Riksdag Committee on Finance's assessment of monetary policy

In June 2014, the Riksdag Committee on Finance decided to commission a third external assessment of the Riksbank's monetary policy. The external assessments are a complement to the Committee's own annual evaluations and the open hearings with the Governor and Deputy Governors of the Riksbank. This third assessment concerns monetary policy 2010–2015 and was made by Marvin Goodfriend, professor at Carnegie Mellon University in Pittsburgh, USA, and Mervyn King, formerly Governor of the Bank of England. Their report was published on 19 January 2016. The Riksbank noted that the assessment provides an important contribution to the examination of monetary policy and announced that the Executive Board will present its comments at the coming consultation procedure. The assessment is therefore not discussed further in this Account of Monetary Policy.

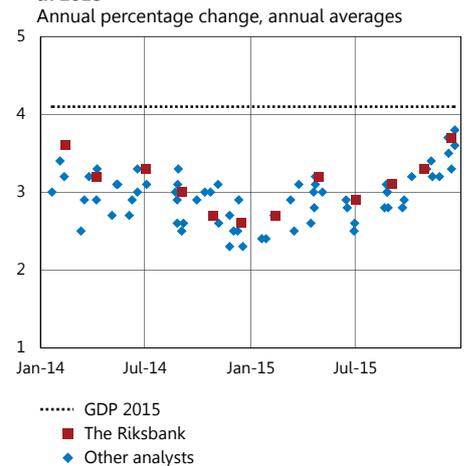
Figure 1:6. Forecasts 2014 and 2015 for the CPIF inflation in 2015



Note. Other analysts refer to those specified in Figure 1:5 except from HUI Research AB. The CPIF is the CPI with a fixed mortgage rate.

Sources: Respective analysts, Statistics Sweden and the Riksbank

Figure 1:7. Forecasts 2014 and 2015 for GDP growth in 2015



Note. Other analysts refer to those specified in Figure 1:5.

Sources: Respective analysts, Statistics Sweden and the Riksbank

■ The Riksbank's development work 2015

The Riksbank works constantly on improving the material on which the monetary policy decisions are based. This article provides examples of the development work the Riksbank conducted in the monetary policy area in 2015. For instance, the Riksbank continued its analysis of the driving forces behind the unexpectedly weak development in inflation in recent years and the effects of using complementary monetary policy measures.

The low inflation in recent years

In recent years, the Riksbank has devoted much work to analysing why inflation has been so weak since 2011. During 2014 and 2015 a number of articles were published in the Monetary Policy Reports, taking different approaches. Last year, two Economic Commentaries were published on this subject. One of them assessed the Riksbank's short-term forecasts in 2013 and 2014, while the other discussed various aspects of how inflation is measured.¹ Towards the end of 2015, an article was published in the Economic Review that summarised and updated the results of the earlier analyses.² The article describes how inflation has developed over the past five years from slightly different perspectives, including an international comparison. Possible explanations for the development were also discussed, first with the aid of simpler relationships between different variables and then with the aid of a model of the Swedish economy.

The results are relatively consistent. The weak economic developments abroad and associated restrained demand in Sweden are important explanations for the low inflation over the past five years. The exchange rate has also contributed to holding back inflation for some of this period. Further, the low commodity prices, particularly for electricity and oil, have dampened inflationary pressures, partly through a direct effect on increases in consumer prices for electricity and oil-related products and partly through an indirect effect via lower costs for companies. During 2014 and at the beginning of 2015, companies have also increased their prices less than one might have expected given the historical patterns. According to the companies themselves, the reduced margins are due to increased competition and uncertainty regarding future economic developments.

Continued development of the inflation analysis

An important part of the analysis of inflation is to try to identify to what extent price changes are temporary. Prices of certain foods could, for instance, be affected in the short term by weather-related factors, which

¹ Löf, M. (2015), "Recent inflation outcomes and forecasts", *Economic Commentaries* No. 4, 2015, Sveriges Riksbank and Johansson, J. (2015), "How is inflation measured?", *Economic Commentaries* No. 5, 2015, Sveriges Riksbank.

² Andersson, B., Corbo, V. and Löf, M. (2015), "Why has inflation been so low?", *Economic Review* 2015:3, Sveriges Riksbank.

in turn may have a temporary effect on inflation. The Riksbank has initiated a small project to improve its analysis, which includes gathering prices via the internet. It is hoped that it will become easier to identify the trend development in inflation by following components with particularly volatile prices, such as foreign travel, fruit and vegetables, and electricity.

To gain a better understanding of how inflation develops the Riksbank has also been asking companies for some time now about their pricing behaviour and costs in the questionnaires in its Business Survey. More questions on purchase prices, sale prices and costs were also included in 2015 in the National Institute of Economic Research's Business Tendency Survey, at the Riksbank's initiative.

The Riksbank's unconventional monetary policy measures

During 2015, the Riksbank has conducted expansionary monetary policy with the aid of unconventional monetary policy measures, that is, a negative repo rate and purchases of government bonds. Although such measures have also been taken by other central banks, the experiences of this type of policy are very limited.

Over the past two years, the Riksbank has therefore put a lot of work into compiling the existing experiences and relating them to Swedish conditions. This work has been described in among others an article in the Monetary Policy Report published in February 2015, which presented the different complementary monetary policy measures. Articles and studies have dealt with the theoretical bases for when and in what ways a central bank can use unconventional monetary policy measures.³ The analyses made have provided a valuable base for the practical policy with a negative interest rate and purchases of government bonds.

Over the year Economic Commentaries have also assessed the measures implemented.⁴ The assessments show that the Riksbank's unconventional measures have contributed to making financial conditions in Sweden more expansionary, in line with how an expansionary monetary policy functions under more normal circumstances. For instance, the Riksbank's purchases of government bonds are assessed to have contributed to lower Swedish interest rates and a weaker krona.

The conceptual framework for monetary policy

The dramatic events on financial markets around the world in recent years and the ensuing period of low inflation and expansionary monetary policy have given rise to an international debate on how monetary policy should best be conducted. In the light of this debate, the Riksbank has for some time been analysing how the conceptual

³ See De Graeve, F. and Lindé, J. (2015), "Effects of unconventional monetary policy: theory and evidence", *Economic Review*, 2015:1, Sveriges Riksbank. See also Boel, P. and Waller, C. J. (2015), "On the Theoretical Efficacy of Quantitative Easing at the Zero Lower Bound", *Working Paper Series* No. 310, Sveriges Riksbank.

⁴ See Alsterlind J., Armelius H., Forsman D., Jönsson B. and Wretman A. (2015), "How far can the repo rate be cut?", *Economic Commentaries*, No. 11, 2015, Sveriges Riksbank. See also De Rezende, R. B., Kjellberg, D. and Tysklind, O. (2015), "Effects of the Riksbank's government bond purchases on financial prices", *Economic Commentaries* No. 13, 2015, Sveriges Riksbank.

framework for monetary policy in Sweden could be developed and improved. During 2015 this investigation work focused on the formulation of the inflation target and analysed whether, and if so how, monetary policy should take into account the uncertainty and risks linked to, for instance, financial imbalances. This work is continuing in 2016.

Continued analysis of economic effects of various macroprudential policy tools

During 2015 the Riksbank continued to analyse the economic effects of different macroprudential policy tools. The Riksbank has been very aware that the expansionary monetary policy can contribute to housing prices and household indebtedness continuing to rise. Macroprudential policy plays an important role with regard to managing these risks. There are several possible tools that can be used to dampen indebtedness and reduce the risks in the housing market, including the mortgage cap, an amortisation requirement and a debt-to-income limit. Changing the right to tax deductions for interest payments is another possible tool, although this comes within the field of fiscal policy.

During 2014 the Riksbank analysed the economic effects of Finansinspektionen's proposed amortisation requirement. The Riksbank has considered this proposal to be a step in the right direction, but that it is insufficient and that further measures must be considered. The Riksbank therefore spent a lot of time in 2015 analysing the economic effects of other measures, such as a debt-to-income limit, lower loan-to-value limit and phasing out of tax deductions for interest payments. Combinations of the measures were also analysed. The results of the analyses were presented in various publications and speeches.⁵ It was noted, for instance, that tools only affecting new borrowers, such as the debt-to-income limit and the loan-to-value limit, in most cases have a limited effect on household indebtedness and limited short-term macroeconomic costs in the form of lower consumption. An adjustment of the tax deduction for interest payments is a potentially more powerful tool for dealing with household indebtedness, as it can affect all borrowers. The short-term macroeconomic costs could thus be greater, although this can be partly offset by the increase in tax revenue entailed.

In the field of macroprudential policy, the Riksbank took the initiative in 2015 for a new conference entitled "Riksbank macroprudential conference", which was organised in June in cooperation with Finansinspektionen and the Swedish House of Finance. The idea is to establish this as an annual conference that will gather policy makers, representatives of the private sector and prominent academics from all over the world to discuss, exchange experiences and learn from the best in the field.

⁵ See, for instance, Guibourg, G., Jonsson, M., Lagerwall, B. and Nilsson, C. (2015), "Macroprudential policy – effects on the economy and interaction with monetary policy", *Economic Review* 2015:2, Sveriges Riksbank, Guibourg, G. and Lagerwall, B. (2015), "How is the economy affected by macroprudential policy measures?" *Economic Commentaries* No. 9, 2015, Sveriges Riksbank and Ingves, S. (2015), "The housing market and household indebtedness from a central bank perspective", speech at SNS conference on the housing market and household indebtedness, published on 19 November 2015.

The Riksbank's research work in 2015

The Riksbank's research is mainly focused on areas of direct significance to the Bank's activities, such as monetary policy, the banking system and financial markets. During 2015 a number of studies by economists at the Riksbank were published in academic journals.⁶

In June, the Riksbank's Research Division organised a conference in which researchers from leading universities and other central banks discussed the causes of deflation, the consequences of deflation and appropriate measures to manage deflation. Large parts of this conference dealt with the unconventional complementary monetary policy measures implemented around the world since the financial crisis.

The Research Division also arranged a workshop together with the Bank for International Settlements (BIS), involving discussion of how monetary policy should relate to the risk of financial imbalances building up.

The Riksbank's other development work over the year.

As part of the work on improving the Riksbank's information supply, the Statistics Division organised a workshop together with the Research Division in the autumn on the topic of "Big Data", that is, how large volumes of data can be processed and analysed. Economists, researchers and statisticians from other authorities, central banks and private sector actors were invited to this workshop to share their knowledge and experiences regarding the possibilities of big data. The workshop discussed how other central banks use new, unconventional data sources and organise their information supply.⁷

⁶ See www.riksbank.se/en/The-Riksbank/Research/Research-publications/Journal-articles/2015.

⁷ See also Hokkanen, J., Jacobson, T., Skingsley, C. and Tibblin, M. (2015), "The Riksbank's future information supply in light of Big Data", *Economic Commentaries* No. 17, 2015, Sveriges Riksbank.

Chapter 2 – Target attainment

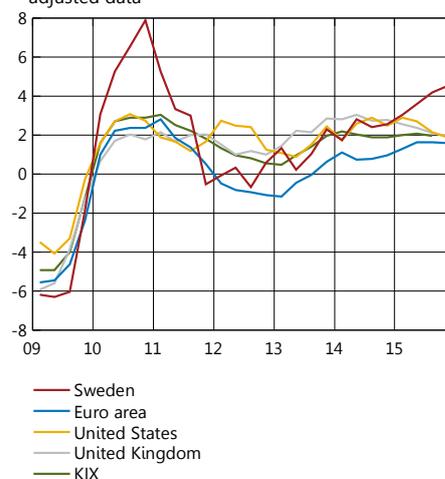
During 2015 economic activity continued to improve in Sweden. GDP increased by 4.1 per cent on an annual basis. However, inflation remained low. CPI inflation was on average 0.9 per cent, while the annual average for CPI inflation, which includes the direct effects of changes in the interest rate, was 0.0 per cent. If both energy prices and the direct effects of changes in the interest rate are excluded, inflation (as the CPIF excluding energy) amounted to 1.4 per cent. It was primarily the monetary policy conducted in the period 2013–2014 that had an influence on the outcome for inflation in 2015. Like those of other analysts, the Riksbank's forecasts overestimated inflation in 2015. This indicates that the forecasting errors are explained by events that all of the analysts found difficult to predict. The reasons why inflation was lower than expected in 2015 included the fall in energy prices, the lower than expected cost pressures and the fact that companies' price increases were lower than expected, given costs and other explanatory variables. During 2013–2014 the monetary policy considerations changed gradually. The Executive Board assessed that it was increasingly important to get inflation to rise towards 2 per cent to maintain confidence in the inflation target. The repo rate was cut by a total of 1 percentage point down to 0 per cent and the repo-rate forecast was revised down. This contributed to inflation rising in 2015 and there was a clear upward trend for underlying inflation. During 2015, the decline in long-term inflation expectations came to a halt and short-term expectations showed an upturn.

Target attainment is a natural starting point for assessing monetary policy. However, a comparison between the outcomes for inflation and the inflation target does not necessarily show how well monetary policy has been conducted. Inflation is of course also affected by a number of other factors than monetary policy, as the economy is constantly being subjected to unexpected shocks. Consequently, even well-founded and carefully-analysed forecasts often turn out to be wrong. It is therefore useful to analyse how the forecasts developed over time in relation to the outcomes to identify the shocks that have caused a potential deviation from the target.

A deviation between the outcomes and the target may also be because the forecasts on which monetary policy was based were not good enough and did not take into account events that actually could have been predicted. A systematic analysis of the quality of the forecasts is therefore an important element in evaluating monetary policy. For example, the Riksbank's forecasts can be compared with the forecasts made by other analysts.

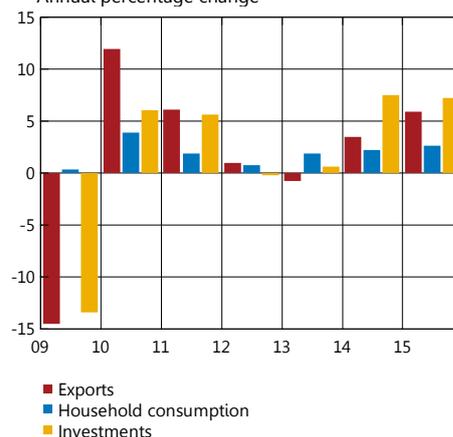
This Chapter initially discusses the outcomes in 2015 for inflation and economic developments in general. After this comes a description of the forecasts made and monetary policy conducted in 2013 and 2014. As there is a lag in the effect of monetary policy, it was primarily through the monetary policy conducted then that the Riksbank had a possibility to influence the outcome for inflation in 2015. The description focuses on identifying whether the events that occurred were unexpected, meaning that the Riksbank's assessment of the economic indicators and inflation prospects, on which monetary policy was based, was incorrect. However, there are no specific boundaries regarding the time lag for the effects of monetary policy. Inflation and economic developments in 2015 were also affected to some extent by the monetary policy conducted in the same year. Monetary policy in 2015 and the deliberations on which it was based are discussed in Chapter 3.

Figure 2:1. GDP in Sweden and abroad
Annual percentage change, seasonally- and calendar-adjusted data



Sources: Bureau of Economic Analysis, Eurostat, national sources, Office for National Statistics and Statistics Sweden

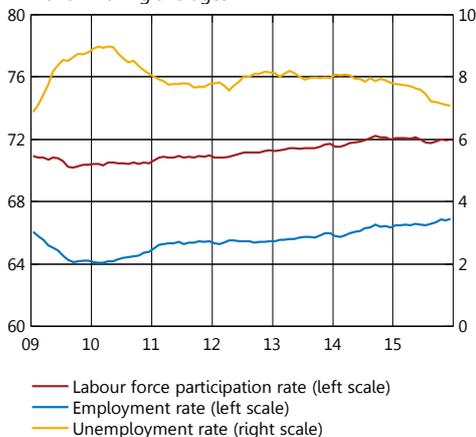
Figure 2:2. Exports, consumption and investments
Annual percentage change



Source: Statistics Sweden

Figure 2.3. Labour force, employment and unemployment

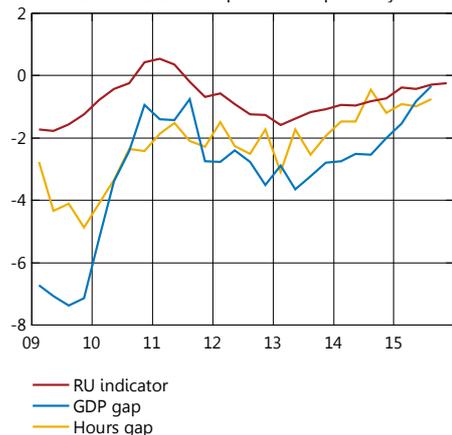
Per cent of the population and per cent of the labour force, aged 15–74, seasonally-adjusted data, three-month moving averages



Source: Statistics Sweden

Figure 2.4. RU indicator, GDP gap and hours gap

Standard deviation and per cent respectively

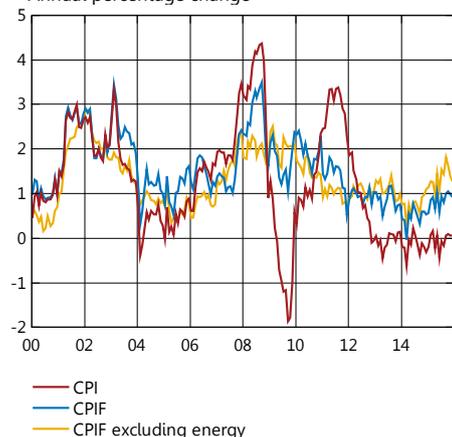


Note. The RU indicator is normalised so that the mean value is 0 and the standard deviation is 1. GDP gap refers to the GDP deviation from trend, calculated using a production function. The hours gap refer to the deviation of number of hours worked from the Riksbank's assessed trend.

Sources: Statistics Sweden and the Riksbank

Figure 2.5. Development of inflation

Annual percentage change



Note. The CPIF is the CPI with a fixed mortgage rate.

Source: Statistics Sweden

This chapter also compares the Riksbank's forecasts with those of other forecasters.⁸ Such a comparison illustrates whether there have been events that were genuinely unexpected or whether it should have been possible to predict them. Finally, there is an analysis of the development of inflation expectations. It is important for the Riksbank's endeavour to attain price stability in the long run that these are anchored around the inflation target.

Economic developments and inflation in 2015

■ Good growth and falling unemployment in 2015

Growth was good in Sweden in 2015, both in an historical and an international perspective. GDP grew by 4.1 per cent, which was more than in 2014 and much higher than the historical average, which is around 2 per cent. Growth was higher than in the United States and the United Kingdom and much higher than in the euro area (see Figure 2:1). Moreover, it was broadly distributed (see Figure 2:2).

Exports increased by 5.9 per cent, compared with 3.5 per cent in 2014. The growth in Swedish exports was higher than both growth in world trade and growth on Swedish export markets, among other reasons due to the rapid growth in exports of services. Investments continued to increase rapidly in 2015, rising by 7.3 per cent, which was roughly the same rate of increase as in 2014. Household consumption increased by 2.6 per cent in 2015, compared with 2.2 per cent in 2014.

The situation on the Swedish labour market continued to improve in 2015, as growth increased. The number of employed rose by 1.4 per cent and the number of hours worked rose by 1.6 per cent. The labour force increased at a slower pace than employment and rose by 0.8 per cent. This meant that unemployment fell compared with 2014, from 7.9 per cent to 7.4 per cent (see Figure 2:3 and Table 2:1).

Tabell 2:1. Production and the labour market according to different measures
Annual percentage change, annual average

	2013	2014	2015
GDP	1.2	2.3	4.1
Number of hours worked	0.4	1.5	1.6
No. of employed, 15–74 years	1.1	1.4	1.4
Labour force, 15–74 years	1.1	1.3	0.8
Unemployment, 15–74 years	8.0	7.9	7.4

Note. Unemployment refers to percentage of the labour force.

Source: Statistics Sweden

The level of activity in the economy is often summarised in the form of some measure of resource utilisation. However, there is no clear-cut method for measuring this. The Riksbank therefore uses a number of indicators to assess the level of resource utilisation. Two such indicators are the GDP gap and the hours worked gap, which measure the percentage deviations of GDP and the number of hours worked from

⁸ A more detailed review of the forecasting performance of the Riksbank and other analysts in a longer-run perspective is provided in Chapter 4.

their respective estimated long-run levels. The Riksbank also has its own indicator of resource utilisation, the RU indicator, which summarises information from surveys and labour market data with the assistance of a statistical method. If the respective measure is positive, it indicates a high level of activity in the economy and a higher level of resource utilisation than normal. The opposite applies when the measurements are negative. All of these three measures indicate that resource utilisation continued rising during the year, and that it was close to a normal level at the end of the year (see Figure 2:4).

■ Inflation moving in the right direction

Underlying inflation measured as the CPIF excluding energy, where both the effects of the Riksbank’s interest-rate adjustments and energy prices have been excluded, was on average 1.4 per cent in 2015 (see Table 2:2 and Figure 2:5).

Over the past year, energy prices have contributed to the low inflation both in Sweden and abroad, partly due to the large fall in the oil price (see Figures 2:6 and 2:7). This is illustrated by CPIF inflation being 0.9 per cent in 2015, thus much lower than CPIF inflation excluding energy (see Table 2:2 and Figure 2:5).

CPI inflation was on average 0.0 per cent in 2015. The fact that CPI inflation was so much lower than CPIF inflation was because interest expenditure for mortgages had fallen, which reflects the Riksbank’s cuts in the repo rate of a total of 0.35 percentage points, from 0.0 per cent at the beginning of the year to -0.35 per cent in October.

All in all, it can be observed that all three inflation measures – the CPIF excluding energy, the CPIF, and the CPI – were higher in 2015 than in 2014.

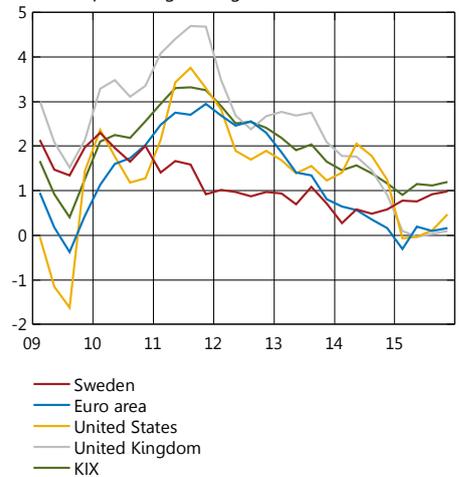
Tabell 2:2. Inflation according to different measures
Annual percentage change, annual average

	2013	2014	2015
CPI	0.0	-0.2	0.0
CPIF	0.9	0.5	0.9
CPIF excluding energy	1.1	0.7	1.4

Note. The CPIF is the CPI with a fixed mortgage rate.
Source: Statistics Sweden

With the exception of energy and interest expenditure, developments of other sub-components of the CPI were stronger than in 2014. Prices of goods, which have fallen on average since 2000, remained stable. Food prices increased faster than in 2014 and also faster than the average for the entire period since 2000. The exchange rate is an important determinant factor for inflation as it affects how prices abroad are “translated” into Swedish import prices. Goods and food prices have a relatively large import content and the krona depreciation in recent years is therefore an important explanation for the faster increase in goods and food prices in 2015 (see Figure 2:8). The rate of price increases on services, which have the largest weight in the CPI, was also higher than in 2014. But compared with goods and food prices, service prices have a much lower import content and weaker relationship to exchange rate

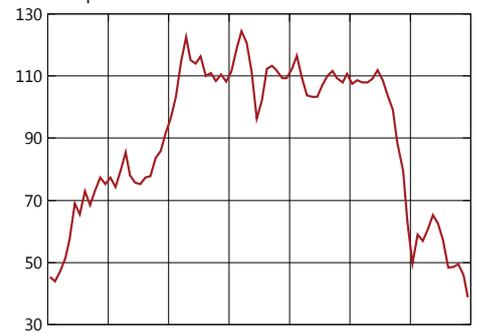
Figure 2:6. Inflation in Sweden and abroad
Annual percentage change



Note. The CPIF is shown for Sweden and the HICP for the euro area. Others refer to the CPI. KIX is an aggregate of the countries that are important for Sweden’s international transactions.

Sources: Bureau of Labor Statistics, Eurostat, national sources, Office for National Statistics, Statistics Sweden and the Riksbank

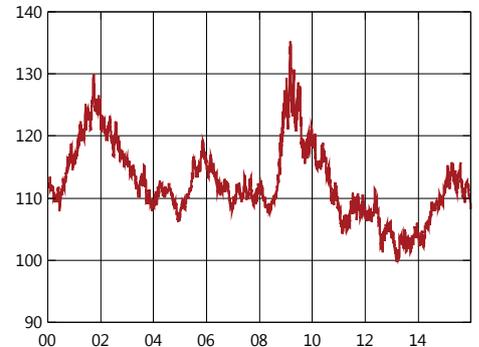
Figure 2:7. Oil price
USD per barrel



Note. Brent oil, outcomes represent monthly averages of spot prices.

Source: Macrobond

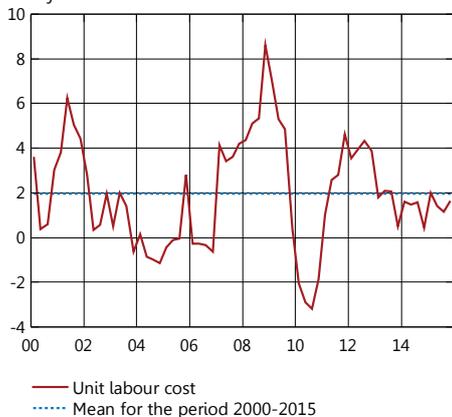
Figure 2:8. KIX-weighted nominal exchange rate
Index, 18 November 1992 = 100



Note. KIX refers to an aggregate of countries that are important for Sweden’s international transactions.

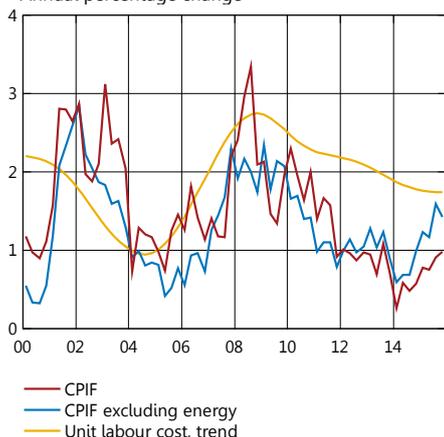
Sources: National sources and the Riksbank

Figure 2:9. Unit labour cost
Annual percentage change, seasonally- and calendar-adjusted data



Source: Statistics Sweden

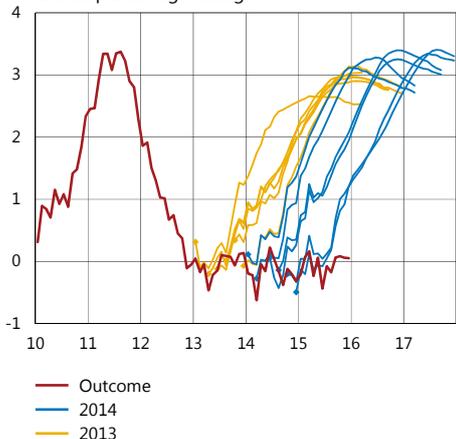
Figure 2:10. CPIF, CPIF excluding energy and trend in unit labour cost
Annual percentage change



Note. The trend in unit labour cost is calculated using a so-called HP filter and refers to the trend in the Riksbank's forecast in February 2016.

Sources: Statistics Sweden and the Riksbank

Figure 2:11. CPI, outcome and forecasts
Annual percentage change



Note. The yellow and blue lines represent the Riksbank's forecasts 2013–2014. The marks show the starting point of each forecast and may therefore deviate from the latest outcome at that point in time.

Sources: Statistics Sweden and the Riksbank

developments, and these prices showed a less clear rise in the rate of price increase compared with previous years (see Table 2:3).

Tabell 2:3. Development of the CPI and its components
Annual percentage change, annual average

	Weight (per cent)	2000–2014	2014	2015
Services	44.8	1.8	0.9	1.2
Goods	25.5	-0.5	-0.6	0.0
Food	17.8	1.8	0.6	2.7
Energy	7.6	4.1	-2.5	-4.9
Interest expenditure	4.2	1.5	-7.0	-16.6
CPI	100.0	1.3	-0.2	0.0

Note. The CPI percentages do not total 100 because of rounding off.

Source: Statistics Sweden

Domestic cost increases have remained moderate (see Figure 2:9). For some time, inflation has moreover appeared unusually low given the trend development in labour costs (see Figure 2:10). A more formal analysis indicates that inflation has been lower than one might have expected, given historical correlations (see Figure 2:21). This analysis is described in greater detail further on in the chapter.

Why did inflation undershoot the target in 2015?

■ Monetary policy and forecasts 2013–2014 in relation to developments in 2015

It was primarily the monetary policy conducted in 2013 and 2014 that gave the Riksbank the opportunity to influence the outcome for inflation in 2015. One way of analysing the causes of the deviations from the inflation target is therefore to examine the accuracy of the forecasts for inflation and other variables made by the Riksbank in 2013 and 2014, which were used as a basis for the monetary policy decisions.

Figures 2:11–2:20 show the actual developments and the Riksbank's forecasts during the years 2013 and 2014 for a number of central variables. The purpose of the figures is to illustrate in a general manner how the Riksbank's view of the future during the years 2013–2014 related to the outcomes. It is therefore not necessary to distinguish individual forecasts.

The overall picture painted by the figures is that the Riksbank overestimated how high inflation would be in 2015 (see Figures 2:11 and 2:12). Therefore, the level of the repo rate was also overestimated (see Figure 2:13). The following sections discuss different causes of these forecasting errors.

■ Swedish economic developments in 2015 largely in line with the forecasts in 2013–2014

Although economic activity abroad improved at a slower pace in 2015 than the Riksbank had expected (see Figure 2:14), the overestimation of

international developments did not contribute to the Riksbank overestimating developments in Swedish GDP in 2015. On the contrary, GDP growth in Sweden in 2015 was somewhat higher than expected (see Figure 2:15). This is due to better development than expected in domestic demand, mainly investment. The forecasts made in 2013 did imply a somewhat faster decline in unemployment than was actually the case, but seen in relation to the forecasts made in 2014, developments in 2015 were roughly as expected (see Figure 2:16).

One can say in general that economic developments in Sweden in 2015 were more or less as the Riksbank expected. The reasons why inflation was overestimated must therefore be sought elsewhere. Below follows an account of the development of inflation in 2015 in relation to the Riksbank's assessments 2013–2014 in three different stages: First comes a description of the development of a measure of underlying inflation, which excludes the effects of the Riksbank's interest-rate adjustments and energy prices, that is, CPIF inflation excluding energy. After that comes an account of the effects of energy prices on inflation, that is, CPIF inflation. Finally, there is a description of the development of CPI inflation, which also includes the effects of interest rates on mortgage expenditure.

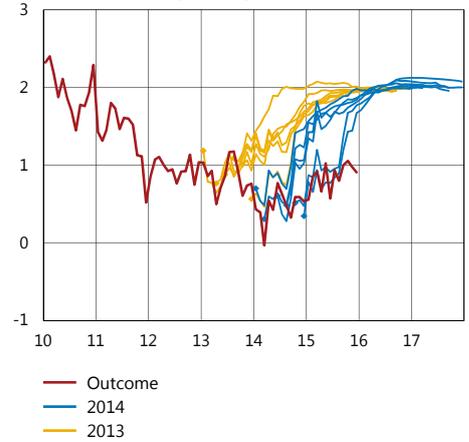
■ **Weak cost pressures and low price mark-ups led to low underlying inflation in 2015...**

To gain a picture of the more lasting development of inflation, which is not affected by large temporary fluctuations in the prices of individual goods and services, the Riksbank follows different measures of what is known as underlying inflation. One such measure is the CPIF excluding energy.

Figure 2:17 shows the Riksbank's forecast for the CPIF excluding energy, made during 2013 and 2014. The Riksbank gradually revised down its assessment of underlying inflationary pressures in 2013 and 2014, which resulted in the forecasts being adjusted downwards. It is also clear that the final forecasts in 2014 succeeded in capturing the rising underlying inflation in 2015 relatively well. The overall picture is nevertheless that underlying inflation in 2015 was overestimated.

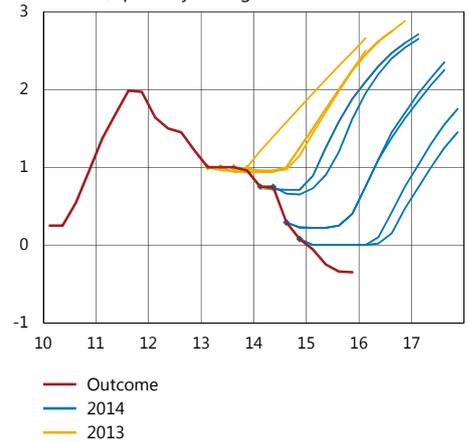
A possible explanation for the overestimation is that cost pressures in the economy were overestimated. Figure 2:18 shows the Riksbank's forecasts for unit labour costs in the Swedish economy. Unit labour costs can be simply described as the difference between wage increases and the development of productivity in the economy. The wage increases that do not have a corresponding productivity growth entail cost increases for the companies. We see that the forecasts made in 2013 and 2014 overestimated cost pressures somewhat. One possible explanation for this is that productivity was unexpectedly strong in 2015. A further possible explanation is that falling energy prices – despite excluding energy prices from the CPIF excluding energy – have nevertheless

Figure 2:12. CPIF, outcome and forecasts
Annual percentage change



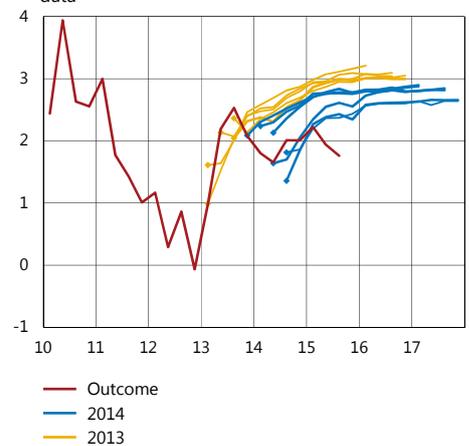
Note. See the note to Figure 2:11. The CPIF is the CPI with a fixed mortgage rate.
Sources: Statistics Sweden and the Riksbank

Figure 2:13. Repo rate, outcome and forecasts
Per cent, quarterly averages



Note. See the note to Figure 2:11.
Source: The Riksbank

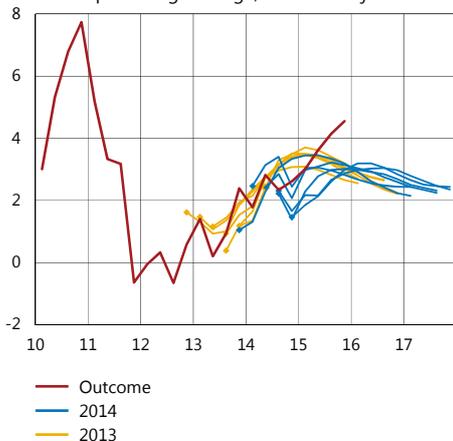
Figure 2:14. GDP abroad, outcome and forecasts
KIX-weighted, quarterly change in per cent, calculated as an annual percentage change, seasonally-adjusted data



Note. See the note to Figure 2:11. KIX refers to an aggregate of countries that are important for Sweden's international transactions.
Sources: National sources and the Riksbank

Figure 2:15. GDP, outcome and forecasts

Annual percentage change, calendar-adjusted data

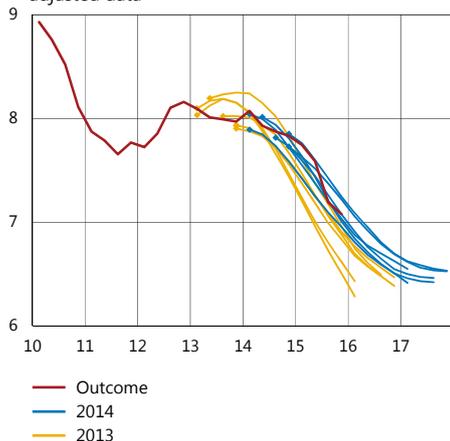


Note. See the note to Figure 2:11.

Sources: Statistics Sweden and the Riksbank

Figure 2:16. Unemployment, outcome and forecast

Per cent of the labour force, aged 15–74, seasonally-adjusted data

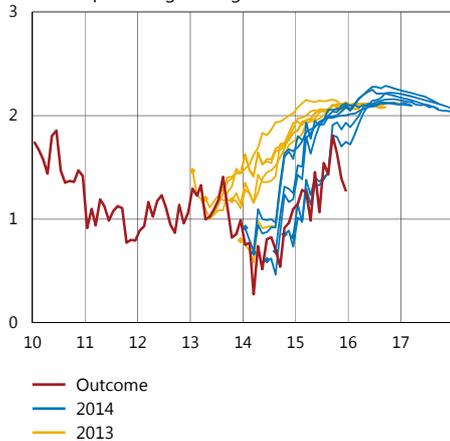


Note. See the note to Figure 2:11.

Sources: Statistics Sweden and the Riksbank

Figure 2:17. CPIF excluding energy, outcome and forecasts

Annual percentage change



Note. See the note to Figure 2:11.

Sources: Statistics Sweden and the Riksbank

contributed to lower underlying inflation via indirect effects, such as lower transport costs.⁹

As noted above, the Riksbank's analysis also indicates that inflation has been unusually low over a period of time, given the trend development in labour costs (see Figure 2:10). This can be interpreted to mean that companies' price mark-ups have been unusually low. The Riksbank's survey, which was carried out by the National Institute of Economic Research in 2014, showed that companies had found it difficult to raise their prices as demand was perceived as weak and uncertain and competition was perceived to be high.¹⁰ It could also be the case that inflation has been low for so long that inflation expectations are affecting the actual price increases to a greater extent than normal and holding them back.

A more formal analysis also indicates that inflation has been lower for some time than is implied by historical correlations (see Figure 2:21). The yellow field in Figure 2:21 shows the span between the highest and the lowest projections of the CPIF excluding energy in five different models that explain the development of inflation with the aid of changes in the exchange rate, unit labour costs, resource utilisation and commodity prices.¹¹ It is natural to include these explanatory variables in an equation that describes the development of underlying inflation. However, the models are relatively similar and it should be emphasised that with different explanatory variables the projections could have looked rather different and the span between the highest and the lowest value would have been wider. The estimates should thus not be regarded as a thorough analysis. The models have been estimated on the basis of developments up to the end of 2010 and outcome data for the explanatory variables have then been used to project inflation.¹² The projections thus show what inflation measured by CPIF excluding energy would have been if it had followed the historical correlations with the explanatory variables. It is clear that underlying inflation has for some time been lower than one might have expected. The fact that the explanatory variables did not succeed in capturing developments indicates that it is other factors that have held back companies' price increases. According to Figure 2:21, however, the situation appears to be on the verge of normalising and the part of inflation that cannot be explained by normal correlations has declined. This picture is confirmed by the Riksbank's forecasts in 2014 for underlying inflationary pressures in 2015 being better in line with the actual outcome (see Figure 2:17)

⁹ See Andersson, B., Corbo, V. and Löf, M. (2015), "Why has inflation been so low?", *Economic Review* 2015:3, Sveriges Riksbank.

¹⁰ See Apel, M., Frohm, E., Hokkanen, J., Nyman, C. and Palmqvist, S. (2014), "Results from a survey on company pricing", *Economic Commentaries* No. 4, 2014, Sveriges Riksbank.

¹¹ The exchange rate's impact on inflation developments in 2015 is discussed more thoroughly in the next section.

¹² See Andersson, B., Corbo, V. and Löf, M. (2015), "Why has inflation been so low?", *Economic Review* 2015:3, Sveriges Riksbank, for a more detailed description.

■ **... but the exchange rate was weaker than expected, which contributed to higher import prices**

An unexpectedly strong exchange rate can lead to inflation being surprisingly low. But Figure 2:19 shows on the contrary that the exchange rate was much weaker in 2015 than the Riksbank had forecast in 2013 and 2014. This could reasonably have contributed to the overestimation of inflation being less than it would otherwise have been. An illustration of this is that goods prices, which have a relatively large import content, remained roughly unchanged in 2015, after falling by around 0.5 per cent in 2013 and 2014 (see Table 2:3).

All in all, the main reason for the overestimation of underlying inflation in 2015 was a combination of cost pressures being somewhat lower than expected and the rate of price increase in relation to cost pressures being unexpectedly low. The unexpected weakening of the exchange rate at the same time contributed to making the overestimation of inflation smaller than it would otherwise have been. The unexpectedly weak exchange rate is in turn partly linked to monetary policy being more expansionary than was anticipated. As the forecasts of underlying inflation were revised down in 2014, they came much closer to the actual development in 2015 (see Figure 2:17).

■ **Heavily falling energy prices contributed to the low inflation in Sweden and abroad**

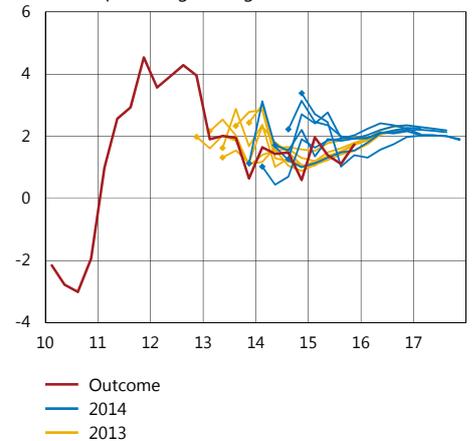
Figure 2:12 shows that CPIF inflation, which includes energy prices, was severely overestimated by the Riksbank when one compares outcomes in 2015 with the forecasts in 2013 and 2014. This is explained by energy prices falling very heavily since the middle of 2014. The oil price fell by more than 50 per cent from the middle of 2014 to the end of 2015. The energy price component in the CPI fell by 5 per cent in 2015, which can be compared with an average increase of just over 4 per cent 2000–2014 (see Table 2:3).

The low energy prices contributed to the forecasting errors for 2015 being much larger with regard to CPIF inflation than for the CPIF excluding energy.

Energy prices contributed to low inflation not only in Sweden but also abroad. As mentioned earlier, the Riksbank overestimated economic developments abroad as a whole in 2015 in the forecasts made 2013–2014. The weak international economic activity may have contributed to international inflation being much lower than the Riksbank's forecasts (see Figure 2:20). Together with the low energy prices, this is probably the main explanation for overestimating international inflation.¹³

¹³ One effect of the low international inflation was that policy rates in several countries and regions important for Sweden's foreign trade remained low. The Riksbank needed to take this into account in its monetary policy, which is described in greater detail in Chapter 3.

Figure 2:18. Unit labour cost, outcome and forecasts
Annual percentage change

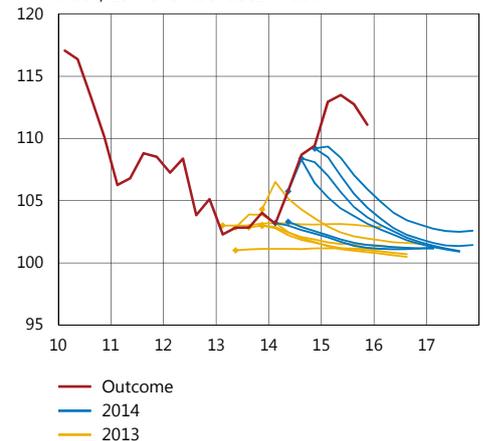


Note. See the note to Figure 2:11.

Sources: Statistics Sweden and the Riksbank

Figure 2:19. KIX-weighted nominal exchange rate, outcome and forecasts

Index, 18 November 1992 = 100

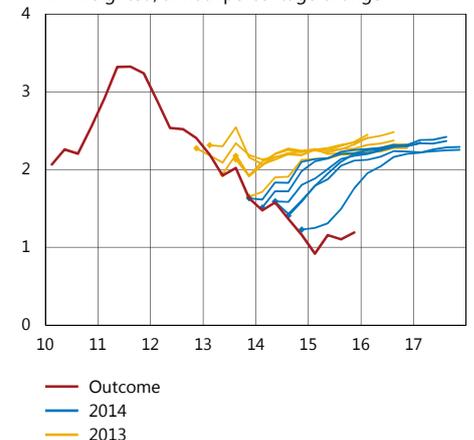


Note. See the note to Figure 2:11. KIX refers to an aggregate of countries that are important for Sweden's international transactions.

Sources: National sources and the Riksbank

Figure 2:20. Inflation abroad, outcome and forecasts

KIX-weighted, annual percentage change



Note. See the note to Figure 2:11. KIX refers to an aggregate of countries that are important for Sweden's international transactions.

Sources: National sources and the Riksbank

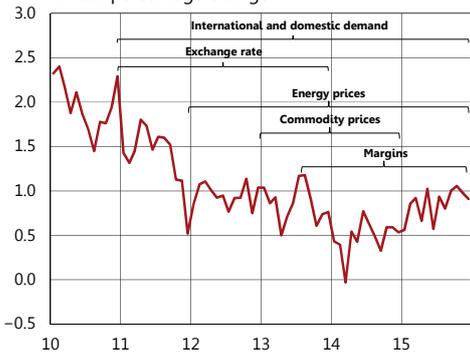
Figure 2:21. Outcome and projections for CPIF excluding energy



Note. The yellow field refers to projections from five different models and shows the span between the highest and the lowest projection, respectively. The CPIF is the CPI with a fixed mortgage rate.

Sources: Statistics Sweden and the Riksbank

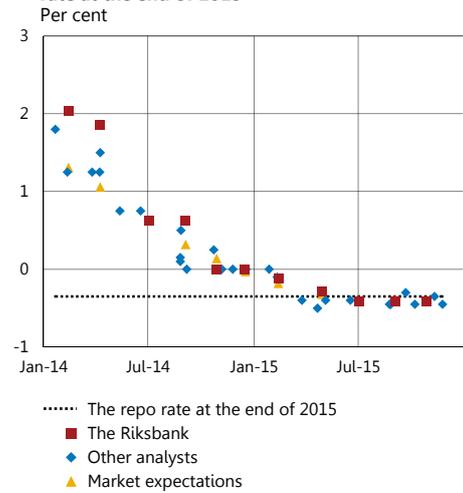
Figure 2:22. The CPIF and the most important explanatory factors for the low inflation in Sweden



Note. The CPIF is the CPI with a fixed mortgage rate.

Sources: Statistics Sweden and the Riksbank

Figure 2:23. Forecasts 2014 and 2015 for the repo rate at the end of 2015



Note. Other analysts refer to the Ministry of Finance, the National Institute of Economic Research, Nordea, SEB and Swedbank. Market expectations are calculated according to market pricing of forward rates. The forward rates are calculated using derivative contracts (RIBA and FRA) adjusted for credit risk premiums.

Sources: Respective analysts and the Riksbank

Figure 2:22 summarises the Riksbank’s analysis of why CPIF inflation was so low in recent years. The analysis shows that different factors have pushed down CPIF inflation over the past five years. For instance, the strong krona appreciation following the financial crisis contributed to holding back inflation up to the end of 2013, but as mentioned earlier, the krona has since depreciated and instead contributed to higher inflation in recent years. Moreover, it shows that low energy prices are an important explanation for the low inflation in 2015 and that also unexpectedly low price mark-ups, or margins, have contributed to some extent.¹⁴

■ **The Riksbank’s repo-rate cuts in 2015 led to low interest expenditure and held back CPI inflation**

The CPI inflation measure includes households’ mortgage costs, which are largely governed by the development of the repo rate. If the Riksbank cuts the repo rate to bring up inflation, mortgage costs will fall, which contributes to CPI inflation going in the “wrong direction” in the short run. This is one reason why the Riksbank focuses on CPIF inflation in its monetary policy analysis, particularly in times when the repo rate changes significantly, which has been the case following the global financial crisis in 2008.

In the light of the unexpectedly low inflation in recent years, the Riksbank has conducted an increasingly expansionary monetary policy and cut the repo rate substantially (see Figure 2:13). In relation to the Riksbank’s forecasts in 2013 and 2014, the cuts were unexpected. As we saw earlier, these forecasts reflected the fact that inflationary pressures would rise, and thus also the level of the repo rate. The repo-rate level in 2015 was several percentage points below the forecasts made in 2013 and the first half of 2014, while the final forecasts made in 2014 were closer to the outcome (see Figure 2:13).

As households’ mortgage costs are largely connected to the development of the repo rate, CPI inflation in 2015 was overestimated substantially and to a greater extent than CPIF inflation (see Figures 2:11 and 2:12).

■ **Changes in the monetary policy considerations 2013–2014**

When one analyses the development of inflation in 2015 and the monetary policy decisions in 2013–2014, it is also important to be aware of the monetary policy considerations at the time. For some time after the financial crisis, the monetary policy decisions have involved finding a balance between how low the repo rate needs to be for inflation to approach the target sufficiently quickly and the increased risks linked to households’ high indebtedness that could stem from a low interest rate. In 2013 and the start of 2014, this balance changed successively. The main reason for this was that inflation was repeatedly found to be lower than expected and that inflation expectations were falling.

¹⁴ See Andersson, B., Corbo, V. and Löf, M. (2015), “Why has inflation been so low?”, *Economic Review* 2015:3, Sveriges Riksbank.

The Executive Board deemed that monetary policy would have to prioritise quickly bringing inflation back on target to a greater extent and pay less consideration to the risks linked with household indebtedness. At the same time, it was noted that the more expansionary monetary policy itself would lead to these risks increasing. The Board therefore said that managing these risks was an urgent matter, but that it must be done by other policy areas than monetary policy, for instance, macroprudential policy.

■ Conclusions on the role of monetary policy in the development of inflation 2015

The overall picture is that the forecasts for developments in 2015 made in 2013–2014 overestimated inflationary pressures in the Swedish economy. As monetary policy was based on these forecasts, one can observe that an even more expansionary monetary policy could have contributed to inflation being closer to the target. However, it is at the same time worth noting that inflation has been overestimated in many countries. This could be a sign that inflation has on the whole responded less well than usual during this period to the relatively substantial monetary policy easing in many areas.

As mentioned earlier, the monetary policy considerations changed gradually in 2013 and 2014, as it became increasingly important to get inflation to rise towards the target. It is clear that the increasingly expansionary monetary policy began to have positive effects on growth and unemployment, as well as inflation, during 2015. As described in greater detail in Chapter 3, monetary policy was made even more expansionary in 2015. The repo rate and the repo-rate path were cut further, and moreover the Riksbank began extensive purchases of government bonds. This could have had a positive effect on inflation as early as 2015, not least via effects on the krona exchange rate.¹⁵ The Riksbank's analysis indicates that the purchases of government bonds have contributed to interest rates in Sweden being lower and the krona being weaker than would otherwise have been the case.¹⁶

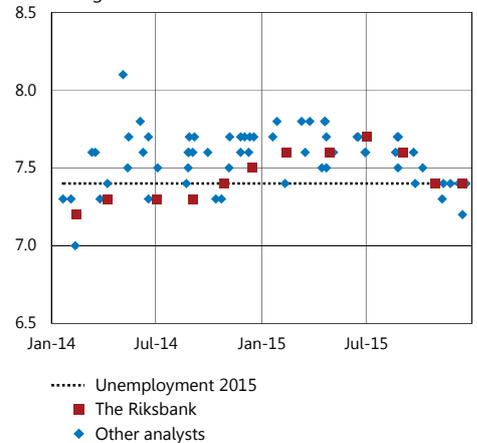
Different measures of underlying inflation show a clear trend reversal over the past year. The weaker krona rate, which in turn is linked to the more expansionary monetary policy, is probably one important reason for the rising inflation (see Figure 2:19).

The Riksbank's forecasts for 2015 compared with those of other forecasters

One central issue is whether the Riksbank's forecasts are in line with those made by other analysts. If this is the case, it is an indication that events occurred which were difficult to predict. On the other hand, if it were revealed that other forecasters succeeded much better than the

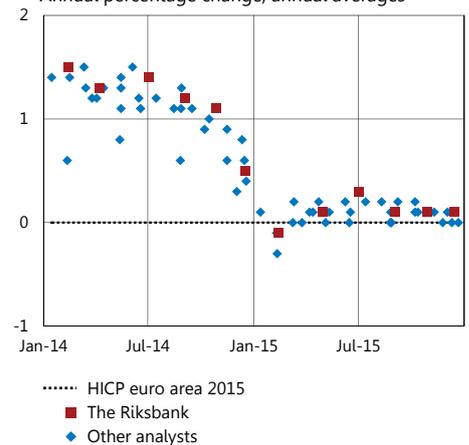
¹⁵ The exchange-rate channel is considered to be one of the channels through which monetary policy can most quickly affect inflation, through its effect on import prices. See Hopkins, E., Lindé, J. and Söderström, U. (2009), "The Monetary Policy Transmission Mechanism", *Economic Review* 2009:2, Sveriges Riksbank.
¹⁶ See De Rezende, R. B., Kjellberg, D. and Tysklind, O. (2015), "Effects of the Riksbank's government bond purchases on financial prices", *Economic Commentaries* No. 13, 2015, Sveriges Riksbank.

Figure 2:24. Forecasts 2014 and 2015 for unemployment in 2015
 Per cent of the labour force, aged 15–74, annual averages



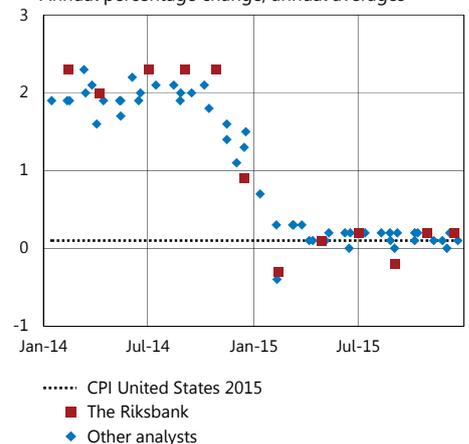
Note. Other analysts refer to those specified in Figure 1:5.
 Sources: Respective analysts, Statistics Sweden and the Riksbank

Figure 2:25. Forecasts 2014 and 2015 of HICP inflation in the euro area in 2015
 Annual percentage change, annual averages



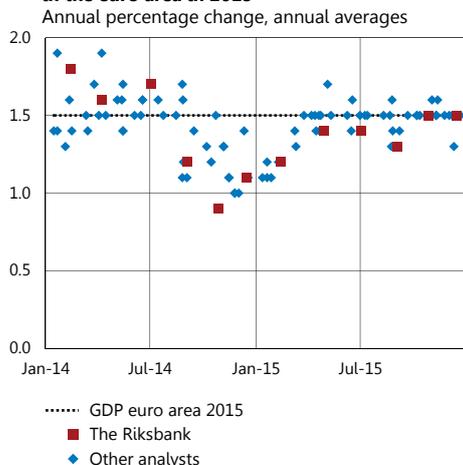
Note. Other analysts refer to Consensus Economics, the Ministry of Finance, IMF, the National Institute of Economic Research, Nordea, OECD, SEB, and Svenska Handelsbanken.
 Sources: Eurostat, respective analysts and the Riksbank

Figure 2:26. Forecasts 2014 and 2015 of CPI inflation in the United States in 2015
 Annual percentage change, annual averages



Note. Other analysts refer to those specified in Figure 2:25 except from Svenska Handelsbanken.
 Sources: Bureau of Labor Statistics, respective analysts and the Riksbank

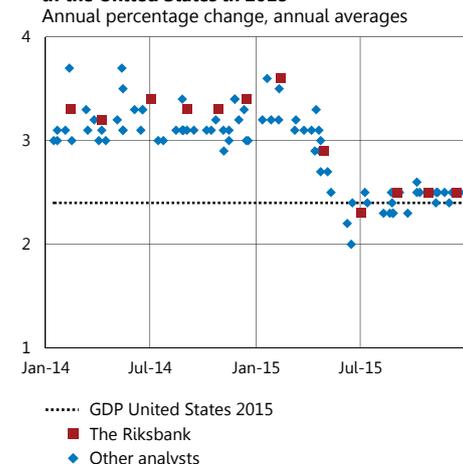
Figure 2:27. Forecasts 2014 and 2015 of GDP growth in the euro area in 2015



Note. Other analysts refer to the Confederation of Swedish Enterprise, Consensus Economics, the Ministry of Finance, IMF, the National Institute of Economic Research, Nordea, OECD, SEB, Svenska Handelsbanken, Swedbank and the Swedish Trade Union Confederation (LO).

Sources: Eurostat, respective analysts and the Riksbank

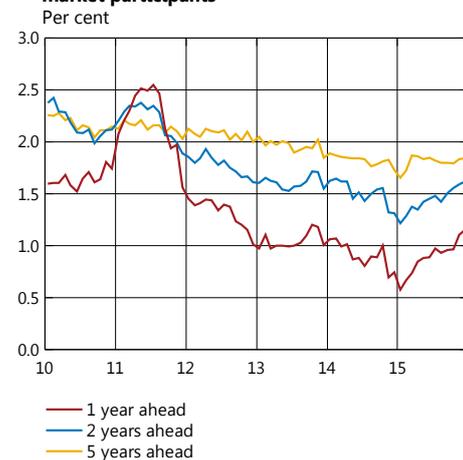
Figure 2:28. Forecasts 2014 and 2015 of GDP growth in the United States in 2015



Note. Other analysts refer to those specified in Figure 2:27.

Sources: Bureau of Economic Analysis, respective analysts and the Riksbank

Figure 2:29. Inflation expectations among money market participants



Source: TNS Sifo Prospera

Riksbank in predicting economic developments, this might indicate that there were inadequacies in the Riksbank's forecasts. Figures 1:5–1:7 and 2:23–2:28 show the forecasts by the Riksbank and other analysts for a number of central variables in 2015 over time, from the beginning of 2014 until the actual outcomes were known. The reason why the figures start in 2014 and not earlier is that most analysts make forecasts two years ahead (for the current year and the next year), not three years ahead like the Riksbank.

A typical pattern is that the forecasts made early on, at the beginning of 2014, were further from the outcome than the forecasts made late, at the end of 2015. This is natural, as towards the end of 2015 there was much more information available on which the forecasts could be based. However, there are examples where the forecasts were initially close to the final outcome, but were then revised in some particular direction and then became more accurate once again. One such example is GDP growth for the euro area.

The figures also show that most analysts' forecasts were relatively close to one another and that they were revised in a similar way. This is a good illustration of the fact that there are constant changes in the economy which are difficult to predict and which mean that forecasts must be successively revised along the way.

■ **Continued downward revisions to the inflation forecasts in Sweden and abroad**

A recurring pattern in the recent years' Accounts of Monetary Policy has been that analysts have overestimated inflation in the earlier forecasts and then been forced to make downward revisions (see Figures A1–A3 in the appendix for inflation forecasts for the years 2012–2014). That is also the case this time. In the middle of 2014, most analysts were counting on CPI inflation in 2015 being between 1 and 2 per cent, instead of 0 per cent, which was the actual outcome (see Figure 1:5).

One reason why the forecasts for CPI inflation were too high was that the repo rate was much lower at the end of 2015, –0.35 per cent, than all analysts were assuming in 2014 (see Figure 2:23). But the analysts have also been forced to revise down their forecasts for CPI inflation, too, which is not affected in the same direct way by interest rate adjustments (see Figure 1:6).

However, the unusually low inflation is not matched by a surprisingly low GDP growth. On the contrary, it appears that growth in 2015 was higher than the analysts were assuming for most of 2014–2015 (see Figure 1:7). The view of GDP growth was also reflected in the view of unemployment, where the forecasts tended mostly to be above the final outcome rather than below (see Figure 2:24).

It was not just inflation in Sweden that was overestimated. The forecasts for the rate of price increase in the euro area and in the United States were also revised down relatively substantially. Analysts were assuming in 2014 that inflation in the United States would be around 2 per cent in 2015 and that it would be around 1.5 per cent in the euro area (see Figures 2:25 and 2:26). In both cases, the outcome for inflation

in 2015 was close to zero. This underlines the fact that the unexpectedly low inflation is to a large degree an international phenomenon.

■ All analysts overestimated inflation

Figures 1:5–1:7 and 2:23–2:28 show that the Riksbank's forecasts were in general in line with those of other forecasters. However, some minor differences can be detected.¹⁷ The Riksbank's forecasts for GDP growth and unemployment in Sweden were closer to the final outcome than those of most other analysts. On the other hand, the Riksbank was one of the analysts that had the highest forecasts of inflation in 2014 for Sweden as well as for the United States and the euro area, and therefore made the largest overestimation of inflation in 2015.

However, the main impression is, as so often is the case, that the revisions to the forecasts made by the Riksbank and other analysts largely followed the same patterns. One conclusion from this is that the deviations between the forecasts and the final outcomes for 2015 can largely be explained by events that all analysts had difficulty predicting.

Inflation expectations 2015

A high level of confidence in the inflation target is important to the Riksbank's efforts to achieve price stability. If the general public is confident that the Riksbank will achieve its target, inflation expectations a few years ahead will be close to the inflation target. This makes the Riksbank's work on actually attaining the target easier.

A high level of confidence in the inflation target also increases the possibilities for monetary policy to stabilise production and employment. If the economic agents are confident that inflation will stabilise around the inflation target, monetary policy will not need to react to the same extent when the economy is hit by shocks that lead to temporary deviations from the inflation target.

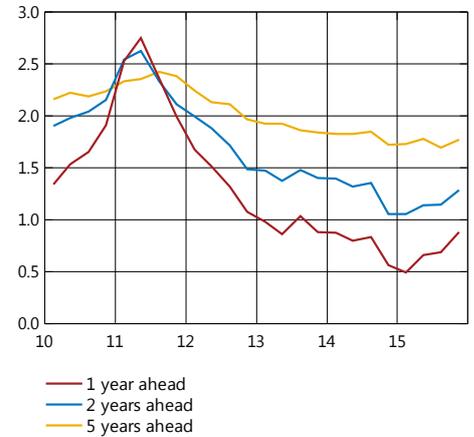
■ Rising inflation expectations over the year

Inflation expectations can be measured in two main ways: either through pricing on the bond market or through direct surveys of various agents.¹⁸

In the monetary policy discussion the survey-based measures of inflation expectations have played a prominent role. On behalf of the Riksbank, TNS Sifo Prospera conducts surveys of inflation expectations among money market agents, employer and employee organisations and purchasing managers in the retail and manufacturing sectors. The survey respondents are asked about expectations of inflation one, two and five years ahead. Inflation expectations among money market participants are measured on a monthly basis, while other agents' expectations are measured once a quarter.

Long-term inflation expectations were for a long time relatively firmly anchored around the inflation target. During the period 2011–

Figure 2:30. All respondents' expectations of inflation
Per cent



Note. Participants surveyed are social partners, purchasing managers and money market participants.

Source: TNS Sifo Prospera

¹⁷ See Chapter 4, Forecasting performance, for a more detailed analysis.

¹⁸ See the article "What do inflation expectations tell us?" in the Monetary Policy Report, February 2016, Sveriges Riksbank.

2014, however, inflation expectations showed a falling trend at all horizons (see Figures 2:29 and 2:30). As noted above, this was an important reason for the changeover to a more expansionary direction for monetary policy in 2013–2014.

Inflation expectations in the short run (one and two years ahead) covary relatively well with actual inflation. When the trend of falling inflation changed into an upturn during 2015, inflation expectations for one and two years ahead also rose. The downturn in inflation expectations five years ahead also appears to have come to a halt. Expectations of inflation five years ahead among money market participants were 1.8 per cent in December 2015, compared with 1.7 per cent in January of the same year. The fact that actual inflation rose and that the downward trend in long-term inflation expectations was broken is proof that the expansionary monetary policy conducted in recent years has had an effect.

Chapter 3 – Monetary policy 2015

Monetary policy became increasingly expansionary during 2015 to support the upturn in inflation and to anchor inflation expectations around 2 per cent. If inflation were to remain low for an even longer period, there could be a risk that long-term inflation expectations would continue to fall and that the role of the inflation target as a benchmark for price-setting and wage formation would be weakened. The repo rate was cut from 0 per cent at the start of the year to –0.35 per cent by the end of the year. In addition, the Riksbank purchased Swedish nominal government bonds on a large scale to make monetary policy even more expansionary.

Monetary policy decisions in 2015

Monetary policy became increasingly expansionary in 2015. The most important reason for this was the low inflation. If inflation were to remain low for an even longer period of time, there was a risk that long-term inflation expectations would fall and thus weaken the credibility of the inflation target. Such a situation could also mean that the inflation target's role as a benchmark for price-setting and wage formation would be weakened.

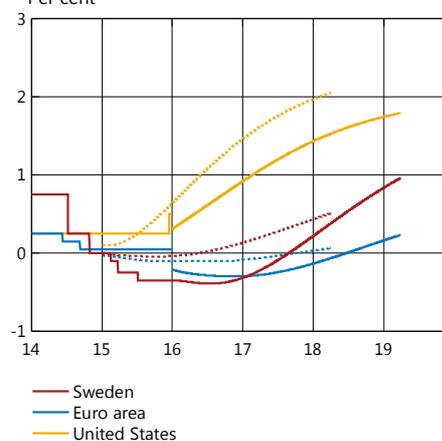
Poorer price-setting and wage formation could restrain the conditions for growth and employment. If inflation and inflation expectations are too low, there is also a risk that monetary policy will become too tight. This is because monetary policy easing and tightening is determined by the real interest rate, that is, the difference between the policy rate and inflation expectations. If the policy rate is close to its lower bound, falling inflation expectations will mean that the real interest rate becomes increasingly higher, and thus that monetary policy becomes tighter. Ultimately, a trend with falling inflation and inflation expectations can therefore be self-fulfilling and mean that the economy is pulled into a recession with weak growth and rising unemployment. To prevent this from happening, it is important that monetary policy safeguards the credibility of the inflation target.

Monetary policy in Sweden was also affected over the year by monetary policy in other countries and by the low interest rates abroad (see Figure 3:1). The European Central Bank's extensive asset purchase programme meant that it was difficult to assess the SEK/EUR exchange rate. A rapid appreciation of the krona would make it more difficult for the Riksbank to attain an inflation rate in line with the target within a reasonable period of time.

The Executive Board signalled that they had a high level of preparedness to make monetary policy even more expansionary if necessary, even between the ordinary monetary policy meetings. For example, the repo rate could be cut further, repo rate rises could be postponed, and purchases of government bonds could be expanded. In addition, it was noted that possibilities also existed to lend Swedish kronor directly to companies, to intervene on the foreign exchange market and to purchase other types of security.

The expansionary monetary policy contributed to rising housing prices and increasing household indebtedness. The Riksbank therefore

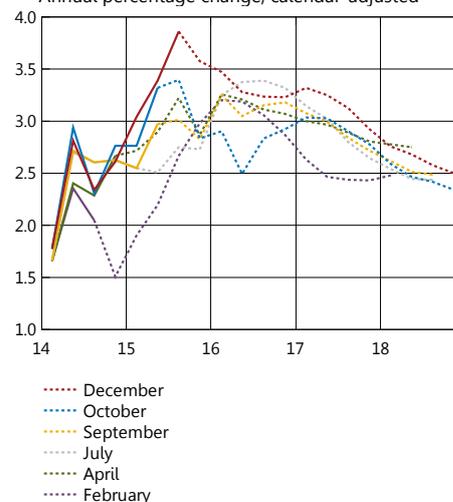
Figure 3:1. Policy rates and rate expectations according to forward rates
Per cent



Note. Forward rates describe the expected overnight rate, which does not always correspond to the policy rate (refi rate for the euro area). Unbroken lines are estimated on 29 Dec 2015, broken lines on 2 Jan 2015.

Sources: Macrobond and the Riksbank

Figure 3:2. GDP, forecasts 2015
Annual percentage change, calendar-adjusted

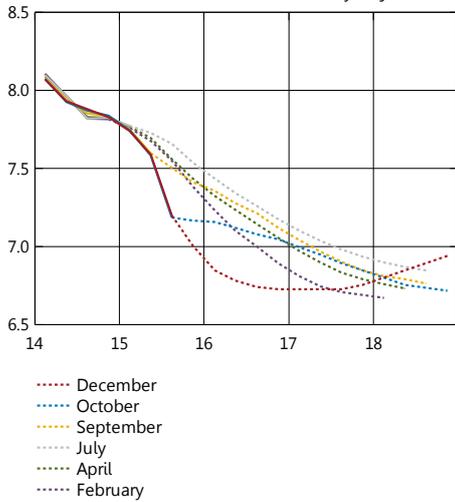


Note. Several outcome lines are shown in the figure. This is because the outcomes have been revised by Statistics Sweden.

Sources: Statistics Sweden and the Riksbank

Figure 3.3. Unemployment, forecasts 2015

Per cent of the labour force, seasonally-adjusted data

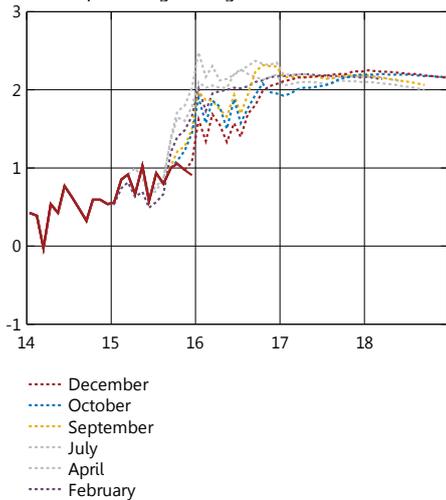


Note. See the note to Figure 3.2.

Sources: Statistics Sweden and the Riksbank

Figure 3.4. CPIF, forecasts 2015

Annual percentage change

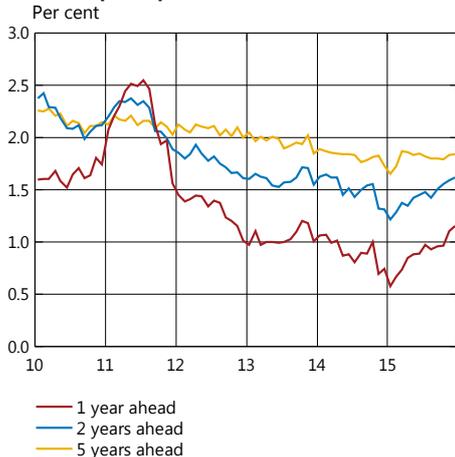


Note. The CPIF is the CPI with a fixed mortgage rate.

Sources: Statistics Sweden and the Riksbank

Figure 3.5. Inflation expectations among money market participants

Per cent



Source: TNS Sifo Prospera

emphasised the importance of adopting measures to reduce the risks inherent in household indebtedness. The responsibility for implementing such measures lies with the Government and other public authorities.

The remaining part of this chapter presents a more detailed description of the development of the economy over the year and the background to the monetary policy decisions.

■ More expansionary monetary policy in February to get inflation to rise towards the target

At the start of 2015, the Riksbank judged that the international recovery would continue at a slow rate in line with previous forecasts, but that the risks for a less favourable development had increased. The economic development differed between regions, which resulted in differences in monetary policy between the United States and euro area, as well as in large fluctuations on the foreign exchange markets. The economic-political developments in Greece also contributed towards the increased risks.

The prospects for the Swedish economy looked comparatively good. GDP growth was expected to increase more rapidly and the labour market to become stronger in the period ahead (see Figures 3:2 and 3:3). The most important factors behind this development were the low oil price, a weaker krona and the low repo rate. Inflation developed approximately as expected, and there were signs that inflation measured as the CPIF and CPIF excluding energy had bottomed out and could be expected to rise.

Consequently, ahead of the monetary policy meeting in February, the assessment was made that CPIF inflation was on the way up (see Figure 3:4). However, the prevailing level of inflation was still low and well below the Riksbank's target of 2 per cent. There was also deemed to be a risk that the low oil price would dampen inflation expectations, and thus inflation, more than had been assumed in the forecast. Long-term inflation expectations had also shown a declining trend for a longer period and were below 2 per cent (see Figure 3:5). In the euro area, the ECB had also announced a more expansionary monetary policy, including large-scale purchases of securities.

The Executive Board therefore considered that monetary policy needed to become even more expansionary. The repo rate was cut by 0.10 percentage points to -0.10 per cent, and the forecast for the future repo rate was also adjusted slightly downwards (see Figure 3:6). In addition, it was decided that the Riksbank would purchase nominal government bonds with maturities from 1 year up to about 5 years in an amount of SEK 10 billion to make monetary policy more expansionary (see Figure 3:7).

■ Further monetary policy measures in March

In January, the European Central Bank (ECB) decided that, as of 9 March, it would purchase bonds to a value of EUR 60 billion per month, with a focus on government bonds. The ECB would continue to do this until

September 2016, or until it could be seen that inflation was moving sustainably towards the target of just under 2 per cent. The ECB thereby intended to purchase financial assets for about EUR 1,100 billion over the period, corresponding to about SEK 10,000 billion. Since mid-February, the Swedish krona had started to strengthen against the euro at a rapid rate, which was probably connected to the ECB’s planned asset purchases (see Figure 3:8).

Under these circumstances, it was difficult to assess how the krona would develop. If it continued to appreciate rapidly, it could put a stop to the ongoing upturn in inflation. Continuing low inflation over an even longer period of time could increase the risk that long-term inflation expectations would fall further. A continued rapid krona appreciation could also worsen conditions for export.

The Executive Board therefore decided at an extraordinary monetary policy meeting held on 18 March that further measures were needed to safeguard the upturn in inflation. The repo rate was cut by 0.15 percentage points to -0.25 per cent (see Figure 3:6). It was also decided to extend purchases of nominal government bonds with maturities of up to 25 years by a further SEK 30 billion (see Figure 3:7). The purchases began on 26 March and were expected to be completed at the start of May.

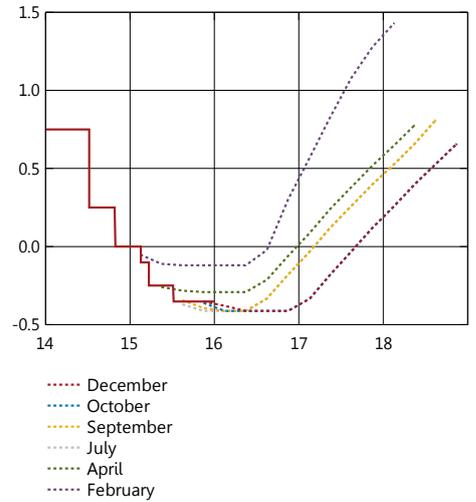
■ Unchanged repo rate in April but extended purchases of government bonds

Given the monetary policy measures implemented earlier, the signs that inflation had begun to rise became clearer in April. The measures also meant that the krona appreciation against the euro in February and March came to a halt. Seen in a longer perspective, this meant that the Swedish krona had weakened, which led to higher import prices and goods prices. Prices for services, which are not affected as much by the exchange rate, had also increased more rapidly than in 2014. There were also signs that inflation expectations had started to rise slightly (see Figure 3:5). Additional positive signs included the continued improvements on the labour market and the good GDP growth. However, there was some uncertainty over how rapidly Swedish companies would be able to raise their prices.

Economic activity abroad improved slowly, more or less in line with the Riksbank’s forecast, and the recovery of the euro area seemed to be on firmer ground. However, uncertainty over economic activity abroad remained high. Weaker international economic activity or a new rapid appreciation of the krona could lead to inflation in Sweden not rising fast enough. The risk of a rapid appreciation of the krona remained heightened in light of the ECB’s comprehensive bond purchases.

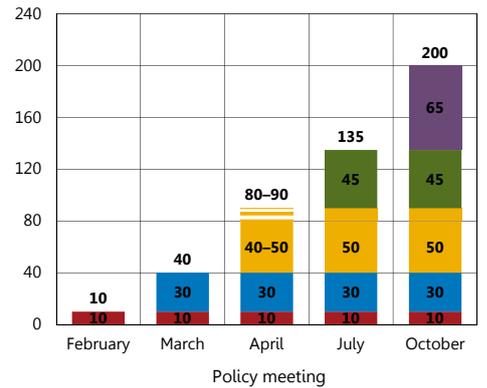
The Executive Board decided, at the monetary policy meeting in April, to hold the repo rate unchanged but to extend purchases of nominal government bonds by an additional SEK 40–50 billion (see Figures 3:6 and 3:7). These purchases would be made during the period May to the end of September. In addition, the forecast for the future repo rate was lowered significantly (see Figure 3:6). Slow increases in the repo

Figure 3:6. Repo rate, forecasts 2015
Per cent



Note. Outcome data are daily rates and forecasts are quarterly averages.
Source: The Riksbank

Figure 3:7. Purchases of government bonds decided by the Riksbank
SEK billion



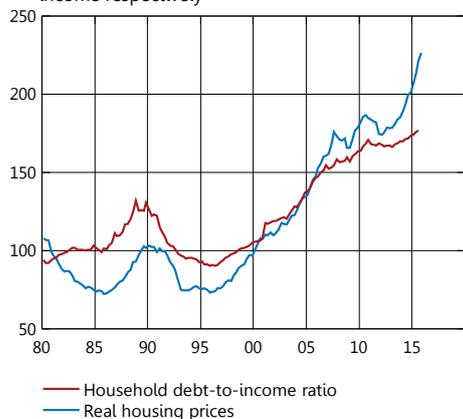
Note. The agreed government bond purchases will continue until the end of June 2016.
Source: The Riksbank

Figure 3:8. Development of the krona against the euro
SEK per EUR



Source: ECB

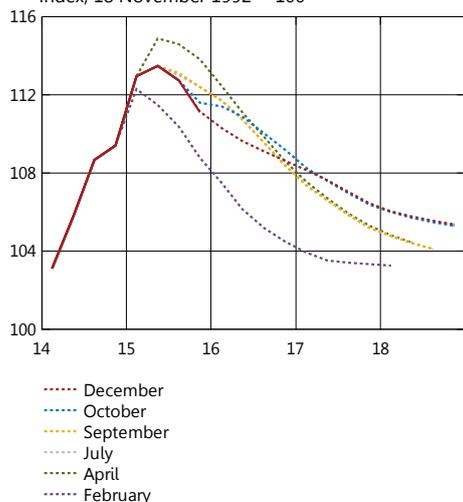
Figure 3:9. Real housing prices and household debt-to-income ratio
Index, 2000 Q1 = 100, and per cent of disposable income respectively



Note. Real housing prices refer to the property price index (single-family houses) and debt refers to total debt. Housing prices have been converted from nominal to real terms by using the CPI.

Sources: Statistics Sweden and the Riksbank

Figure 3:10. KIX-weighted nominal exchange rate, forecasts 2015
Index, 18 November 1992 = 100



Note. KIX refers to an aggregate of countries that are important for Sweden's international transactions.

Sources: National sources and the Riksbank

rate were not expected to begin until the second half of 2016. The forecast of the future repo rate also reflected the presence of a probability that the Riksbank would make further cuts to the repo rate.

It was emphasised that monetary policy needed to be highly expansionary to push up inflation and thus reduce the risks associated with a situation in which inflation is too low over a long period of time. Concerns were also expressed that the low interest rates could contribute towards the trends of rising housing prices and increasing indebtedness among households continuing (see Figure 3:9).

■ More expansionary monetary policy in July due to increased international uncertainty

By the start of the summer, it was possible to see increasing signs that the expansionary monetary policy was starting to have an effect. Inflation measured in terms of the CPIF had risen to 1.0 per cent. At the same time, economic activity was continuing to strengthen and the situation on the labour market to improve. Economic activity also strengthened in the euro area, although several countries continued to be weighed down by high indebtedness and as-yet unsolved structural problems. Another source of unease was provided by developments in Greece, which made the situation for the euro area as a whole hard to assess.

Since the monetary policy meeting in April, the foreign exchange and fixed income markets had been characterised by relatively wide fluctuations. The ECB's asset purchases and uncertainty over the timing and speed of the approaching interest-rate increases in the United States formed two factors contributing to this. The Swedish krona had also appreciated against several currencies, meaning that the trade-weighted exchange rate, KIX, was slightly stronger than was forecast in April (see Figure 3:10). Uncertainty and the relatively strong fluctuations on the foreign exchange market made it difficult to assess how the exchange rate would continue to develop. If the exchange rate were to become too strong in relation to earlier forecasts, this could mean that prices of imported goods would increase more slowly and also that demand in the Swedish economy would become lower. Such a development would risk breaking the upturn in inflation.

At the monetary policy meeting in July, the assessment was therefore that monetary policy needed to be even more expansionary to ensure that inflation would continue to rise towards the target of 2 per cent. The repo rate was cut by 0.1 percentage points to -0.35 per cent. In addition, the planned purchases of nominal government bonds were extended by SEK 45 billion to a total of SEK 135 billion until the end of the year (see Figure 3:7). The purchases decided upon in April were expected to be concluded in September, at which point the new purchases would be initiated.

■ **Unchanged repo rate for rest of the year but extended purchases of government bonds in October**

Incoming statistics over the summer indicated that the international recovery was continuing. Growth improved in the United States and United Kingdom in the second quarter, while the euro area continued to grow at a moderate pace. There was considerable uncertainty over economic developments abroad. Among other things, there were tendencies towards less favourable development in China and other emerging market economies, which contributed to falling prices for oil and other commodities. However, the Swedish economy continued to develop strongly and revisions to the forecasts were small overall.

For a longer period, the Riksbank had adopted strong measures to reduce interest rates in general in the Swedish economy and thereby to make monetary policy more expansionary. These measures were deemed largely to have functioned as expected. The expansionary monetary policy was considered to have been an important reason for why inflation measured as the CPIF excluding energy had risen from around 0.5 per cent to 1.5 per cent over the last year. Monetary policy was expected to provide support to the continued positive development of the Swedish economy, and the forecast for CPIF inflation in 2016 was close to 2 per cent.

The rising inflation in Sweden and the fact that the economy had developed according to the forecast formed the basis for the Executive Board's decision at the monetary policy meeting in September to hold the repo rate unchanged at -0.35 per cent and to continue to purchase nominal government bonds according to the earlier plan. However, there were factors that could call for making monetary policy even more expansionary. The fall in oil prices could come to have a more significant effect on long-term inflation expectations. However, the risk of this was deemed to be smaller than previously, as inflation was now higher and inflation expectations had stopped falling. Another factor that entailed continued risks for the development of inflation was the uncertain development abroad, which was linked to unease over weaker development in China, among other things.

The international recovery had continued in the run-up to the monetary policy meeting in October, but uncertainty remained over the strength of it. Inflation abroad was judged to be somewhat lower than in the previous forecast, and many central banks were expected to conduct an expansionary monetary policy for even longer. This was something that Swedish monetary policy needed to consider, as it risked strengthening the krona exchange rate further and faster than in the forecast. A new source of uncertainty was the large numbers of people fleeing to and seeking protection in Europe. However, it was too early to assess the macroeconomic effects of this either in Sweden or in the rest of Europe.

The worsened inflation prospects abroad and a new assessment that it would take stronger demand in Sweden to stabilise inflation around 2 per cent led to the inflation forecast being revised downwards slightly in relation to September's forecast. The Executive Board decided that

monetary policy needed to remain more expansionary over an even longer period of time to support the positive development in the Swedish economy and safeguard the robustness of the upturn in inflation. The purchases of nominal government bonds were therefore extended by a further SEK 65 billion (see Figure 3:7), bringing them to a total of SEK 200 billion by the end of the first half of 2016. The repo rate was left unchanged at -0.35 per cent but an initial raise in the rate was deferred by approximately six months compared with the assessment from September (see Figure 3:6).

After the monetary policy meeting in October, the Swedish economy developed slightly more strongly than had been expected. The situation on the labour market continued to improve and indicators showed that labour demand remained high. The increased immigration was also expected to lead to higher employment in the short term, even if developments in the longer term were deemed to be less certain. In Prospera's quarterly survey for December 2015, inflation expectations rose compared with the survey from September.

Inflation remained low among many of Sweden's most important trading partners, even if it was expected to rise in the near future. It was deemed that international monetary policy was continuing to be expansionary: among other things, the ECB extended its bond purchases and lowered its deposit rate at the start of December. According to market pricing, the Federal Reserve was expected to raise the policy rate in December but continued increases were expected to take place slowly and from a low level.

The low level of international interest rates also meant that Swedish monetary policy needed to continue to be expansionary. Otherwise the krona exchange rate would be at risk of strengthening earlier and at a faster rate than in the forecast, which would make it harder to get inflation up and stabilise it around 2 per cent. A continued expansionary monetary policy was also needed to support a high level of demand in the Swedish economy and thus an upturn in more domestically-generated inflation. The Executive Board decided at its monetary policy meeting in December to maintain the repo rate at -0.35 per cent and to continue to purchase government bonds in the first six months of 2016, as decided in October.

After the monetary policy meeting in December, the Swedish krona appreciated against several currencies. If this development had continued, the inflation upturn that had begun could have been broken off. The Riksbank therefore maintained a high level of preparedness to intervene on the foreign exchange market, which was communicated clearly.¹⁹

¹⁹ See "Governor Stefan Ingves comments on the Swedish krona", press release no. 26, 30 December 2015.

Important issues in the monetary policy discussion 2015

There were primarily three questions that had an impact on the Executive Board's discussions in connection with the monetary policy decisions made in 2015. The first concerned the continuing low inflation and the risk that inflation expectations would continue to fall. The second was monetary policy abroad and what could be done to prevent an overly rapid appreciation of the krona. The third question concerned the Riksbank cutting the repo rate to negative numbers for the first time and also beginning to buy government bonds on a large scale.

The Executive Board also discussed, as it has done during the monetary policy meetings in the previous years, the high household indebtedness and rising housing prices. The more expansionary monetary policy has entailed increased risks linked to household indebtedness, which the Riksbank pointed out on several occasions. There is therefore an urgent need for measures to create a healthier development in household debt. This applies both to measures that can contribute to a more efficient housing market and to measures that in various ways reduce households' propensity to take on debt. Several members of the Executive Board emphasised the importance of the Government quickly ensuring that Sweden has a framework for macroprudential policy.

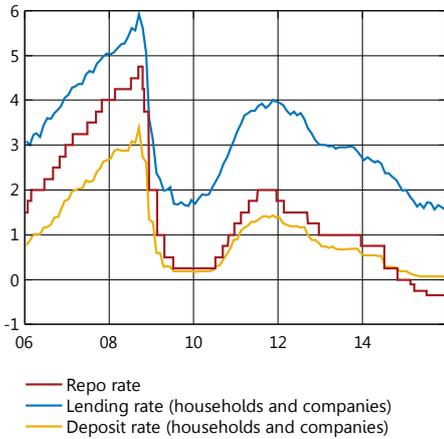
■ The low rate of inflation

The Riksbank's monetary policy over the year reflected the fact that the tolerance for low inflation was very limited. The monetary policy measures discussed were therefore primarily to cut the repo rate further, to buy more government bonds, to begin lending to companies directly via the banks and to intervene in the foreign exchange market. There was still a high level of preparedness to make monetary policy even more expansionary, even between the ordinary monetary policy meetings.

Over the course of the year, the Executive Board discussed several different factors that risked dampening inflation and inflation expectations. Wage negotiations in 2016 were one such factor. If the social partners were to assume wage increases in their negotiations that were not in line with the inflation target, there was a risk that this would lead to a negative spiral where inflation and inflation expectations would cause each other to decline in a mutual interaction. This could also have adverse consequences for GDP and employment.

Economic developments abroad play an important role for economic activity and inflation in Sweden. The assessment of developments abroad was therefore an important factor in the monetary policy discussions. During the summer the problems in Greece dominated the discussions. The contagion effects to the rest of the euro area proved to be limited, however, and therefore did not jeopardise the recovery in the euro area. However, several countries in the euro area still had structural problems and weak public finances. The weak developments in China were due to the transition from an export-driven

Figure 3:11. Repo rate together with the deposit and lending rate to households and companies, new contracts
Per cent



Note. MFI's average deposit and lending rates for households and companies.

Sources: Statistics Sweden and the Riksbank

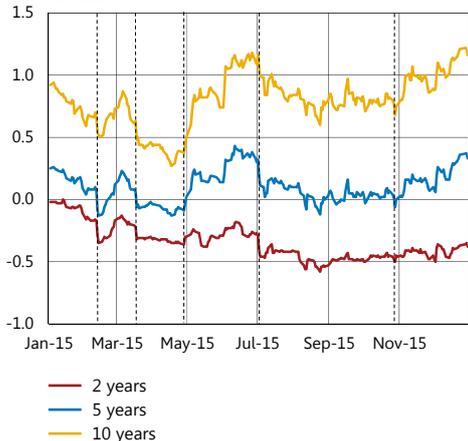
Figure 3:12. Interest rates in Sweden with up to 2-year maturity
Per cent



Note. The rate for government bonds and mortgage bonds refers to the implied zero coupon rate. The broken vertical lines indicate the dates on which the Riksbank's government bond purchases were announced.

Source: The Riksbank

Figure 3:13. Government bond yields, Sweden
Per cent



Note. All bond yields are interpolated to fixed maturities and calculated as zero coupon yields. The broken vertical lines indicate the dates on which the Riksbank's government bond purchases were announced.

Source: The Riksbank

to a more domestically-driven economy. But it was difficult to assess how severe the slowdown would be and to what extent it would have effects via financial markets and other countries and thereby have an impact on Sweden.

The oil price continued to fall, after some upturn at the beginning of the year. The effects this has on the economy depend to some extent on whether the fall is driven by an increased supply or lower demand, and on how long the price fall continues. If the oil price becomes permanently lower as a result of an increase in supply, it could be beneficial for long-term GDP growth, but in the short term it means that global inflation falls, which also pushes down the already low Swedish inflation.

■ **Monetary policy abroad**

For a small open economy like Sweden's, the exchange rate is always very important. Furthermore, in a situation where domestic real economic conditions do not have the impact on inflation as expected, the exchange rate becomes even more significant. The development of the exchange rate was therefore of central importance in the monetary policy discussions over the year.

At the beginning of the year, the ECB decided to buy assets on a large scale, with a focus on government bonds. This contributed to supporting the recovery in the euro area, but the purchases also risked strengthening the krona exchange rate. An appreciation of the krona could dampen the low long-term inflation expectations even further and make it much more difficult to attain the inflation target within a reasonable period of time.

■ **Negative interest rates and purchases of nominal bonds**

At the beginning of the year the policy rate was cut to negative numbers and the Riksbank also began to purchase government bonds on a large scale. Both of these measures have historically been very unusual for central banks. The Executive Board therefore discussed the potential problems and effects of such measures.

Three potential problems were identified with regard to negative interest rates. The first concerned technical and practical complications that negative interest rates can entail, that is, that laws, statutes, terms and conditions of agreements and similar are not designed for a situation with negative interest rates. However, these problems proved to be limited.

The second problem concerned the possibility that the demand for cash would increase. So far, this has not been a problem. However, the lower the repo rate becomes, the greater will be the risk that demand for cash gradually begins to increase.

The third problem discussed was that economic agents would not act in the same way in a world with negative interest rates as in a world with positive interest rates. There is a risk that agents who face falling negative rates in their search for yield would increase the risk in their

portfolios more than they would if it had been positive rates that were falling.

All in all, however, cutting the repo rate to negative levels has so far functioned largely as expected. Households and companies' deposit rates have not become negative (see Figure 3:11). On the other hand, the cuts have so far had an impact in a normal way on lending rates for both households and companies, as well as on other market rates (see Figures 3:11 and 3:12).

The Riksbank can influence inflation and economic developments through changes in the repo rate, but also by buying and selling different assets on a large scale. The effects that such transactions entail depend, for instance, on what assets are bought or sold, how the purchases or sales are communicated, how market pricing functions and how strained public finances are.

Purchasing government bonds on a large scale may be appropriate if the central bank wants to make monetary policy more expansionary when the policy rate has attained or is close to its lower bound. The purchases can then push down different market rates, particularly long-term rates. It is also conceivable that the purchases, by reducing the number of bonds in the market, will force or entice investors to instead hold other, more risky assets. Companies and households will then find it easier to obtain funding, which could stimulate economic activity. The exchange rate may also weaken if investors instead choose to invest to a greater extent in foreign assets. In practice, it is difficult to measure the effects of the bond purchases on long-term interest rates, as these are constantly affected by other factors. The Riksbank's analysis of the government bond purchases indicates that the interest rates and interest rate differential between Sweden and other countries have tended to fall when the purchases have been announced (see Figures 3:13 and 3:14). The analysis also indicated that the purchases have had roughly the same effect as in international studies. It is assessed that the Swedish government bond yields are lower than they would have been without these purchases.

Monetary policy decisions and reservations 2015

11 February The repo rate was cut by 0.10 percentage points to –0.10 per cent and the forecast for the future repo rate was adjusted slightly downwards. In addition, the Riksbank decided to buy nominal government bonds for SEK 10 billion. Deputy Governor Martin Flodén entered a reservation against the purchase of government bonds.

18 March The repo rate was cut by 0.15 percentage points to –0.25 per cent and a decision was taken for the purchase of nominal government bonds for a further SEK 30 billion.

28 April The repo rate was held unchanged at –0.25 per cent and a decision was taken for the purchase of nominal government bonds

Figure 3:14. Yield differential with Germany
Government bond yields, per cent



Note. Yield differentials between Sweden and Germany. All bond yields are interpolated to fixed maturities and calculated as zero coupon yields. The broken vertical lines indicate the dates on which the Riksbank's government bond purchases were announced.

Sources: Thomson Reuters and the Riksbank

for a further SEK 40–50 billion. In addition, the forecast for the future repo rate was lowered significantly compared with the decision in February.

1 July The repo rate was cut by 0.10 percentage points to –0.35 per cent and the purchases of nominal government bonds were extended by a further SEK 45 billion from September until the end of the year. Deputy Governor Henry Ohlsson entered a reservation against the decision to cut the repo rate and preferred to hold it unchanged at –0.25 per cent.

2 September The repo rate was held unchanged at –0.35 per cent and the previous decision to purchase nominal government bonds until the end of the year was upheld.

27 October The repo rate was held unchanged at –0.35 per cent. An initial raise of the repo rate was deferred for about six months compared with the previous assessment. The purchases of nominal government bonds were extended by a further SEK 65 billion.

14 December The repo rate was held unchanged at –0.35 per cent and purchases of nominal government bonds continued according to the decision in October.

Chapter 4 – Forecasting performance

Compared with other analysts, the Riksbank appears to have made relatively good forecasts for GDP growth and unemployment during the period 2007–2015. On the other hand, the forecasts for CPI inflation and the repo rate were poorer. This year's account also assesses the forecasts for GDP growth and inflation in the euro area and the United States and international policy rates. The evaluation shows that all analysts during the period 2007–2015 overestimated GDP growth in the euro area and the United States. The assessment also shows that both the Riksbank and market expectations have overestimated international policy rates. The differences between the forecasting performance of the various analysts are in general very small.

Assessment of forecasts made in the period 2007–2015

The Riksbank and other analysts present a number of forecasts every year for the development of the Swedish economy. Most analysts also publish forecasts of international economic developments.

It is important to make an assessment of the accuracy of the forecasts as these comprise a base for decision-making. With regard to monetary policy, it is particularly important that the forecasts are accurate, as an interest-rate adjustment affects the economy with some time lag and the policy must therefore be forward-looking. As the Swedish economy is to a large extent affected by developments abroad, it is important that the forecasts of international developments are also accurate.²⁰

As the economy is constantly affected by different events that are difficult to foresee, the accuracy of the forecasts will vary. By comparing the Riksbank's forecasts with those of other analysts, one obtains a picture of how well the Riksbank has succeeded in its forecasting work. Such a comparison indicates whether the Riksbank's forecasts have an acceptable level of accuracy or whether it would have been possible to make better assessments. A forecast evaluation can therefore often serve as a basis for improving the accuracy of future forecasts.

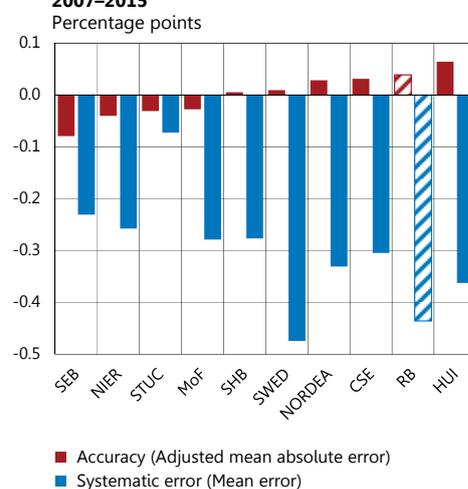
The evaluation in this chapter covers a longer period of time, 2007–2015, which means that the results are less sensitive to random differences between different forecasters. Despite the fact that a longer period of time is being studied, one should bear in mind that the period was to a great extent affected by the financial crisis 2008–2009, and by its consequences. The evaluation is based on forecasts of developments up to two years ahead.^{21, 22}

²⁰ The article "Does the Riksbank sufficiently take into account Sweden's international dependence in its forecasts?" analyses to what extent changes in the Riksbank's forecasts of developments abroad have affected the forecasts of developments in the Swedish economy.

²¹ The year 2007 is used as starting point as it is problematic to assess the Riksbank's forecasts prior to that year. Up to 2005 the forecasts were conditional on an unchanged repo rate during the forecast period and between 2005 and 2007 they were based on market expectations of the development of the repo rate, in the form of forward rates. For a further description of the problem of assessing the Riksbank's forecasts prior to 2007, see Andersson, M. and Palmqvist, S. (2013), "A fairer picture of the Riksbank's inflation forecasts", *Economic Commentaries* No. 7, 2013, Sveriges Riksbank.

²² For international policy rates, forecasts are assessed for up to three years ahead. Figures A4–A12 in the appendix show an evaluation of the Riksbank's forecasts for the individual year 2015.

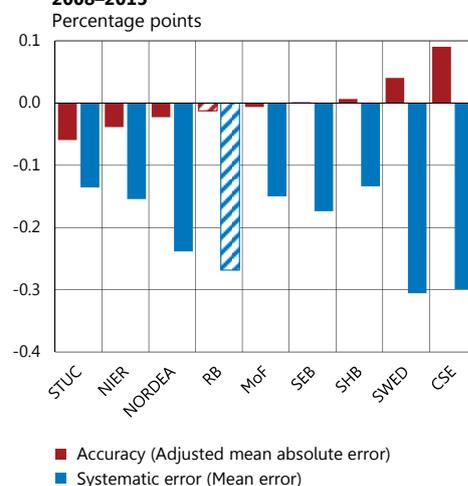
Figure 4.1. Accuracy and systematic errors in the forecasts of various analysts for CPI inflation 2007–2015



Note. CSE = The Confederation of Swedish Enterprise, HUI = HUI Research AB, MoF = Ministry of Finance, NIER = National Institute of Economic Research, RB = The Riksbank, SHB = Svenska Handelsbanken, STUC = Swedish Trade Union Confederation and SWED = Swedbank.

Sources: Respective analyst and the Riksbank

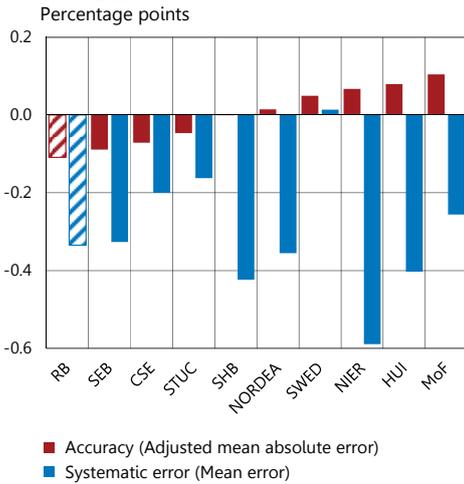
Figure 4.2. Accuracy and systematic errors in the forecasts of various analysts for CPI inflation 2008–2015



Note. See Figure 4.1 for an explanation of the abbreviations. The CPI is the CPI with fixed mortgage rate.

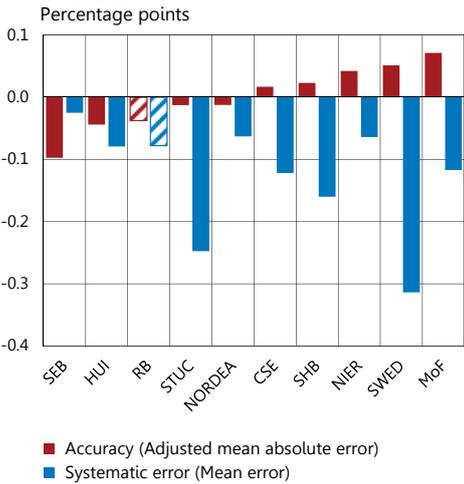
Sources: Respective analyst and the Riksbank

Figure 4:3. Accuracy and systematic errors in the forecasts of various analysts for GDP growth 2007–2015



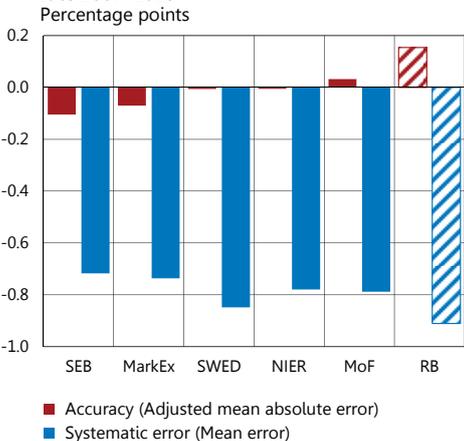
Note. See Figure 4:1 for an explanation of the abbreviations. Some of the Swedish Trade Union Confederation's forecasts have been recalculated from calendar-adjusted to actual GDP with the aid of the National Institute of Economic Research's real-time calendar.
Sources: Respective analyst and the Riksbank

Figure 4:4. Accuracy and systematic errors in the forecasts of various analysts for unemployment 2007–2015



Note. See Figure 4:1 for an explanation of the abbreviations.
Sources: Respective analyst and the Riksbank

Figure 4:5. Accuracy and systematic errors in the forecasts of various analysts for the year-end repo rate 2007–2015



Note. See Figure 4:1 for an explanation of the abbreviations. Market expectations are calculated according to market pricing of forward rates. The forward rates are calculated using derivative contracts (RIBA and FRA) adjusted for credit risk premiums. The Riksbank's quarterly forecasts have been interpolated to daily values to produce a value at the end of the year.
Sources: Respective analyst and the Riksbank

■ **Measures of forecasting performance**

Forecasting performance can be evaluated in many different ways, using a number of different statistical methods. Normally, forecasting errors are calculated as outcome minus forecast and then various statistical measures are used to describe the properties of the forecasting errors.

A desirable property of forecasts is that they are not systematically too high or too low. A common measure of systematic error, also known as bias, is the mean error. The mean error is calculated as the mean value of the forecasting errors during a certain period of time. It thus describes how far the forecasts have on average deviated from the outcomes, that is, whether there is a systematic over-estimation or under-estimation in the forecasts. A negative mean error indicates that the forecasts have on average overestimated the outcomes, while a positive value indicates that the forecasts have underestimated the outcomes. If the forecasts lack a bias, the mean error is zero.

A mean error close to zero, that is, the absence of systematic errors, does not necessarily mean that the forecasts have been accurate. Large positive and negative forecasting errors can offset one another and wrongly give the impression of good accuracy. To avoid this problem, one usually studies what are known as mean absolute errors. These are calculated as the average of the absolute amounts in the forecasting errors.²³

One difficulty when comparing forecasts from different analysts is that they often do not make their forecasts at the same point in time and therefore they have not usually based their forecasts on the same mass of information. An analyst making its forecasts after all the others can base its forecasts on a larger mass of information and can thus be expected to have better accuracy.

The way that differences in access to information can affect the forecasts is illustrated in Figures 1:5–1:7 and 2:23–2:28. These figures show how the forecasts by different analysts have changed between the times the forecasts were made. Typically, the forecasts from the beginning of 2014 are relatively far from the outcomes in 2015 and as time passes the forecasts become gradually more accurate.

It is therefore important when evaluating forecasting performance to take into account the fact that different forecasters have had access to different amounts of information when making their forecasts. The Riksbank has therefore developed a statistical method that adjusts for the difference between different analysts with regard to the mass of information available at different points in time.²⁴ This evaluation therefore describes what are known as adjusted mean absolute errors, that is, mean absolute errors that take into account the fact that some analysts on average make their forecasts at a later date than others and therefore have access to more information. The adjusted mean absolute errors are reported as a deviation from the mean value calculated for all

²³ The absolute amount, sometimes called the absolute value, is a number's distance to zero, that is, the absolute amount of 1 and -1 is 1 in both cases.
²⁴ For a description of the method, see Andersson, Michael and Aranki, T. (2009), "Forecasters' performance – what do we usually assess and what would we like to assess?" *Economic Review*, 2009:3, Sveriges Riksbank.

forecasters. This results in the value for some analysts being negative, which should be interpreted to mean that they are better than the average. A lower adjusted mean absolute error thus indicates better accuracy.

Weak development surprised all analysts

The blue columns in Figures 4:1–4:5 show systematic errors, measured as mean error, for CPI and CPIF inflation, GDP growth, unemployment and the repo rate in Sweden. The fact that the mean errors are negative means that all analysts have systematically overestimated the outcomes of all of these variables during the period 2007–2015. This shows that all analysts in the comparison were surprised by the weak economic developments in the past nine years. However, with regard to unemployment the overestimation is due to the outcome being better than expected.

The blue columns in Figures 4:6–4:9 show systematic errors for GDP growth and inflation in the euro area and the United States respectively. The figures show that all analysts on average during the period 2007–2015 overestimated GDP growth in both the euro area and the United States. However, the picture of inflation in the euro area and the United States looks somewhat different. Mean errors are generally small for all analysts and there is no clear concurrence between the different analysts’ systematic errors. Some forecasters have tended to overestimate inflation abroad on average, while others have underestimated it.²⁵

Minor differences in accuracy between the forecasters

The red columns in Figures 4:1–4:9 show accuracy, measured in terms of adjusted mean absolute errors (reported as a deviation from the mean value calculated for all analysts), for the period 2007–2015 for the domestic and international variables.²⁶ A negative column for one analyst means that the accuracy of the forecasts is better than for the average analyst and a positive value means that it is poorer. The results imply that there are certain differences in accuracy between the different analysts. However, these differences are relatively small, which is confirmed by statistical tests showing that the differences are not usually statistically significant.²⁷

Riksbank relatively good at forecasting GDP growth and unemployment

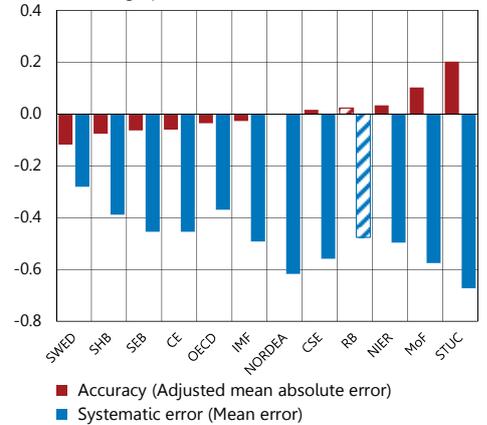
The Riksbank’s forecasts of CPI inflation were less accurate, measured as adjusted mean absolute error, than the average for all analysts. SEB showed the best accuracy. However, with regard to CPIF inflation the Riksbank’s accuracy was somewhat better than the average.

²⁵ For a more in-depth analysis of the Riksbank’s international forecasts, see Aranki, T. and Reslow, A. (2015), “An assessment of the Riksbank’s international forecasts”, *Economic Commentaries* No. 14, 2015, Sveriges Riksbank.

²⁶ For CPIF inflation the period is 2008–2015, as the CPIF measure was introduced in July 2008. The forecasts by the Riksbank and other analysts at the beginning of the period may also refer to the CPIX. These are then assessed against the CPIX outcomes. The common factor for these two measures is that they disregard the direct effects of changes in mortgage rates.

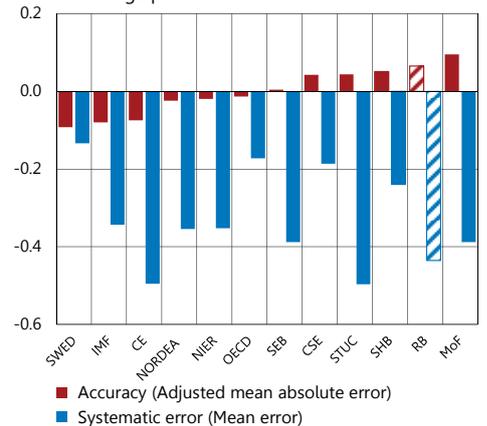
²⁷ See the text and tables in A1 and A2 in the Appendix.

Figure 4:6. Accuracy and systematic errors in the forecasts for GDP growth in the euro area by various analysts 2007–2015
Percentage points



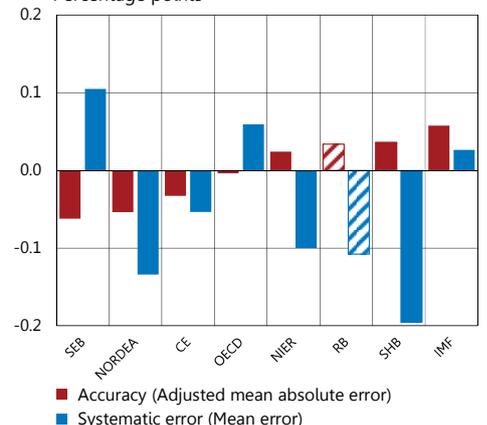
Note. See Figure 4:1 for an explanation of the abbreviations. CE = Consensus Economics.
Sources: Respective analyst and the Riksbank

Figure 4:7. Accuracy and systematic errors in the forecasts for GDP growth in the United States by various analysts 2007–2015
Percentage points



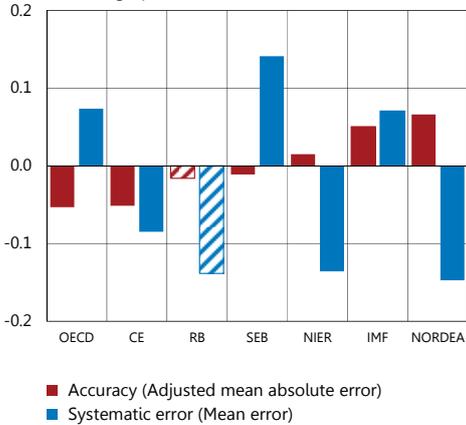
Note. See Figure 4:6 for an explanation of the abbreviations.
Sources: Respective analyst and the Riksbank

Figure 4:8. Accuracy and systematic errors in the forecasts for HICP inflation in the euro area by various analysts 2007–2015
Percentage points



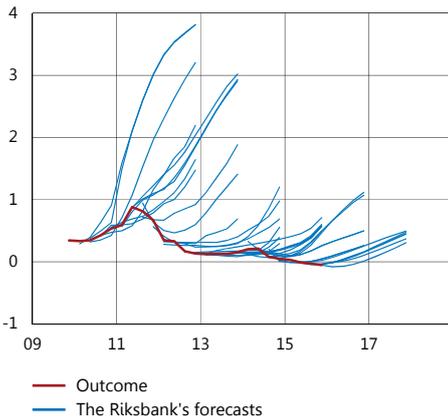
Note. See Figure 4:6 for an explanation of the abbreviations.
Sources: Respective analyst and the Riksbank

Figure 4:9. Accuracy and systematic errors in the forecasts for CPI inflation in the United States by various analysts 2007–2015
Percentage points



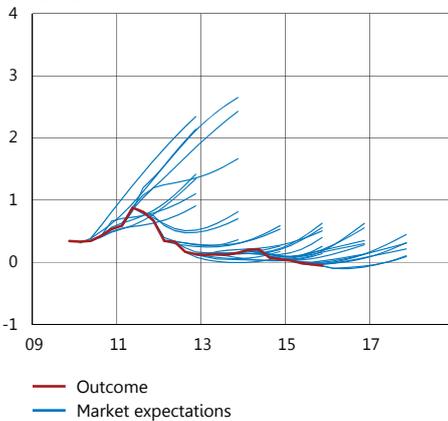
Note. See Figure 4:6 for an explanation of the abbreviations.
Sources: Respective analyst and the Riksbank

Figure 4:10. The Riksbank's forecasts of international policy rates (KIX3)
Per cent



Note. International policy rates refer to relative KIX-weighting of the euro area, the USA and the UK.
Sources: National sources and the Riksbank

Figure 4:11. Forecasts of international policy rates (KIX3) according to market expectations
Per cent



Note. International policy rates refer to relative KIX-weighting of the euro area, the USA and the UK. Market expectations are calculated according to market pricing of forward rates. The forward rates are calculated using derivative contracts (RIBA and FRA) adjusted for credit risk premiums.
Sources: National sources and the Riksbank

The Riksbank had the best accuracy for GDP growth and was better than the average for unemployment. With regard to the repo rate, however, the Riksbank was the least accurate of all forecasters. The repo rate plays a central role for the difference between the CPI and the CPIF. The relatively lower accuracy of the interest rate forecasts could be partly an expression of the Riksbank's need, in common with other central banks, to assess the development of the (real) interest rate in a rather long time perspective. When doing so it is natural to assume that both the policy and target variables will eventually normalise. During the special period since the financial crisis – when interest rates have fallen to historically-low levels, at the same time as inflation has been lower than expected – this assumption has had a negative impact on the precision of the forecasts. That the Riksbank has been less successful in predicting the development of its own policy variable, the repo rate, is notable and not particularly satisfactory. On the other hand, it shows that the Riksbank has been prepared to reconsider its assessments and to adapt monetary policy when necessary.

The Riksbank's accuracy with regard to GDP growth in the euro area was close to the average, while the forecasts for GDP growth in the United States were less accurate. The Riksbank's forecasts for HICP inflation in the euro area were somewhat less accurate than the average, at the same time as the accuracy for CPI inflation in the United States was somewhat better.

It is worth noting that large international organisation such as the IMF and the OECD come close to the average with regard to accuracy in the forecasts of GDP growth in the euro area. The OECD's forecasts for GDP growth in the United States and forecasts for the HICP inflation in the euro area are also close to the average, at the same time as the CPI forecasts for the United States are the most accurate of all. With regard to the IMF's forecasts for the United States, the reverse applies – the GDP forecasts for the United States are among the most accurate, while the forecasts of CPI inflation are close to the average. The IMF's forecasts of HICP inflation for the euro area were poorer than those of other analysts.

Table 4:1 presents the Riksbank's annual ranking of forecasts of domestic variables. Note that this ranking does not take account of the fact that the differences in forecasting performance between the different forecasting institutions are relatively small.

■ **The Riksbank's forecasts overestimated international policy rates**

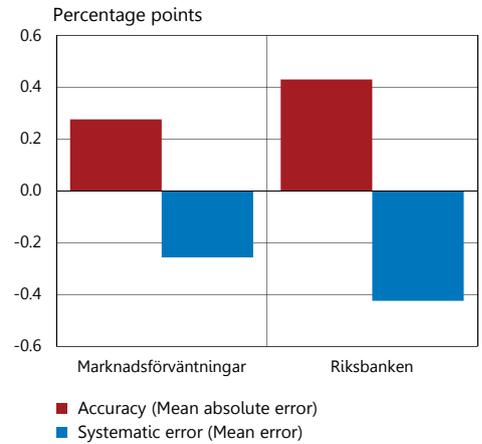
The Riksbank regularly publishes forecasts of international policy rates, in the form of an aggregate of the policy rates in the euro area, United States, Norway and the United Kingdom. These forecasts cannot be evaluated in the same way as other variables as few other analysts regularly make comparable forecasts of these policy rates. On the other hand, the Riksbank's forecasts can be compared with market expectations (according to market pricing of forward rates adjusted for

risk premiums).²⁸ Figures 4:10 and 4:11 show the Riksbank's and the market's aggregate forecasts for international policy rates (with reference to the euro area, the United States and the United Kingdom) during the period 2010–2015. The forecasts range up to three years ahead and refer to quarterly averages. Both the market's and the Riksbank's forecasts have been inaccurate. For most of the evaluation period it was forecast that the aggregate international policy rate would rise, which was not the case. However, the Riksbank's forecast paths were often steeper as they were expecting a more rapid increase in the aggregate international policy rate than the market.

Figure 4:12 shows mean errors and mean absolute errors calculated using forecasting errors regarding whole-year forecasts for the current year, next year and the year after that.²⁹ The blue columns in Figure 4:12 indicate that both the market and the Riksbank have overestimated the development of the aggregate international policy rate in their assessments during the period 2010–2015. The somewhat higher red column for the Riksbank shows that the Riksbank on average has had poorer precision in its forecasts.

If the forecasts that refer to the final year in the forecast horizon are excluded (that is, the forecasts made earlier than two years before the outcome) the differences in accuracy between the Riksbank and the market are much smaller (see Figures A13 and A14 in the appendix). This implies that it is primarily the Riksbank's forecasts in the longer run that have had lower accuracy.

Figure 4:12. Accuracy and systematic errors in forecasts of international policy rates (KIX3) 2010–2015



Note. International policy rates refer to relative KIX-weighting of the euro area, the USA and the UK. Market expectations are calculated according to market pricing of forward rates. The forward rates are calculated using derivative contracts (RIBA and FRA) adjusted for credit risk premiums.

Source: The Riksbank

Tabell 4.1. Annual ranking of the Riksbank's forecasts for the Swedish economy 2007–2015

	GDP	Unemployment	CPI	CPIF	Repo rate
2007	3	5	4	—	4
2008	5	2	5	5	4
2009	3	7	10	7	6
2010	2	6	4	1	3
2011	3	3	4	2	5
2012	2	8	7	4	6
2013	5	2	8	6	6
2014	7	1	7	7	5
2015	2	3	7	8	5
2007–2015	1	3	9	4	6
Of no. institutions:	10	10	10	9	6

Note. The figures in the table give the Riksbank's ranking, based on estimated accuracy according to the adjusted mean absolute error. The highest ranking is 1. The assessment of the repo-rate forecasts includes market expectations according to market pricing of forward rates. The forward rates are calculated using derivative contracts (RIBA and FRA) with an adjustment for credit risk premiums.

Sources: Respective forecasters, Statistics Sweden and the Riksbank

■ Minor differences in forecasting errors between the analysts

The evaluation of the forecasts shows that there are some differences in forecasting performance between the different forecasters. The Riksbank is relatively better with regard to forecast some variables and poorer with

²⁸ Forward rates have not been calculated for Norway as the Norwegian money market lacks several of the interest derivatives used in the calculations (swaps or forwards with the overnight rate as reference rate).

²⁹ Normal mean absolute errors can be used in this comparison without needing to be adjusted for the volume of information, as market expectations are calculated at the same time as the Riksbank's forecasts.

regard to others, but the differences are not usually statistically significant. The fact that the differences between the analysts are small is illustrated clearly in Figures 1:5–1:7 and 2:23–2:28, which show the forecasts for 2015 outcomes. When one then studies a longer period of time, these differences between analysts generally appear even smaller.

For instance, the difference in the accuracy of the forecasts 2007–2015 of CPI inflation by the Riksbank (RB) and the best forecaster SEB is 0.12 percentage points (see Figure 4:1). This should be related to CPI inflation on average being around 1 per cent during the same period. With regard to GDP growth, the difference in accuracy between the Riksbank and the Ministry of Finance (MoF) is 0.21 percentage points (see Figure 4:3). The Ministry of Finance's forecasts have thus been somewhat less accurate than the Riksbank's, but again the difference is not particularly large. GDP growth during the same period of time was on average around 1.5 per cent. It is important to see the ranking of accuracy among the different analysts in the light of these relatively small differences.

■ Does the Riksbank sufficiently take into account Sweden's international dependence in its forecasts?

A small, open economy like Sweden is to a large degree affected by developments abroad. One question one might ask is whether the Riksbank has sufficiently taken into account Sweden's international dependence in its forecasts. This article analyses how the Riksbank during the period 2007–2015 has changed its domestic forecasts when the international forecasts changed. The analysis shows that the Riksbank has given due consideration to international developments in its revisions to the forecasts for inflation.

Inflation and growth in Sweden covary strongly with those in other countries

Sweden is a small open economy with substantial international trade. The globalisation of the financial markets in recent decades has also increased the financial links between Sweden and other countries. Economic activity in Sweden is therefore largely governed by developments abroad. This is documented in several empirical studies.³⁰

At first glance, these data appear to confirm this conclusion. Figures 4:13 and 4:14 show how GDP growth in Sweden and abroad and inflation in Sweden and abroad have comoved during the period 1995–2015.³¹ But how strong is the comovement?³² As the visual impression of the figure implies, the correlation between GDP growth in Sweden and abroad is very high, 0.9, while the correlation for inflation is around 0.5. Even if the correlation for inflation is lower than for growth, it is important to note that there is still a high and clearly significant correlation.

The strong correlation in the data makes it important to analyse whether this is reflected in the Riksbank's forecast revisions. The question is: Has the Riksbank when revising its international forecasts made revisions to the forecasts for domestic variables in line with the strong international dependence shown in historical patterns?³³

To gain an indication of how the Riksbank should on average revise the forecasts for Swedish GDP growth and inflation when revising these variables for other countries, one can use the same information as in Figures 4:13 and 4:14 but draw the international variables onto the X-axis

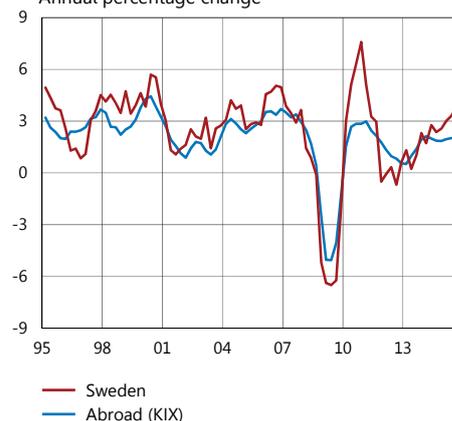
³⁰ An early study that emphasises the significance of international trade for Swedish business cycles is Lindbeck, A. (1975), *Swedish Economic Policy*, MacMillan, Basingstoke. Lindé, J. (2003), "Monetary Policy Shocks and Business Cycle fluctuations in a Small Open Economy: Sweden 1986–2002", *Working Paper Series* No. 153, Sveriges Riksbank, finds support for Lindbeck's conclusions. Bonomolo, P., Corbo, V. and Lindé, J. (2016), "On the Sources of Business Cycle Fluctuations in Small Open Economies: Sweden 1995–2015", under publication in *Working Paper Series*, Sveriges Riksbank, finds support for financial links being significant for economic fluctuations.

³¹ The international variables are weighed together with KIX weights that capture the relative significance of the countries to which Sweden exports and from which it imports. For other countries inflation is measured in terms of the CPI, while inflation in Sweden is measured in terms of the CPIF, which adjusts for the direct effects of changes in the repo rate as this measure provides fairer comparisons.

³² One way of measuring the strength of the correlation between developments in Sweden and abroad is to take into account the so-called correlation coefficient, which can assume values between -1 and 1. A value of 0 means that there is no correlation at all, a value of 1 represents the maximum positive correlation and -1 the maximum negative correlation.

³³ It should be noted that the article does *not* study the accuracy of the forecasts of domestic variables given that international dependence is taken into account. If one wishes to have a complete picture of this, one must also take into account the forecasting errors in the international forecasts. The accuracy of the international forecasts has been studied in Chapter 4.

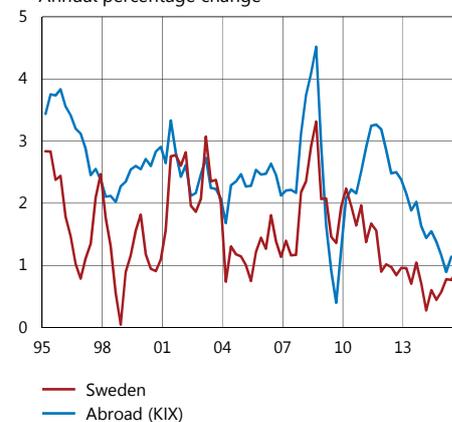
Figure 4:13. GDP growth in Sweden and abroad
Annual percentage change



Note. Correlation coefficient = 0.90. KIX refers to an aggregate of countries that are important for Sweden's international transactions.

Sources: National sources, Statistics Sweden and the Riksbank

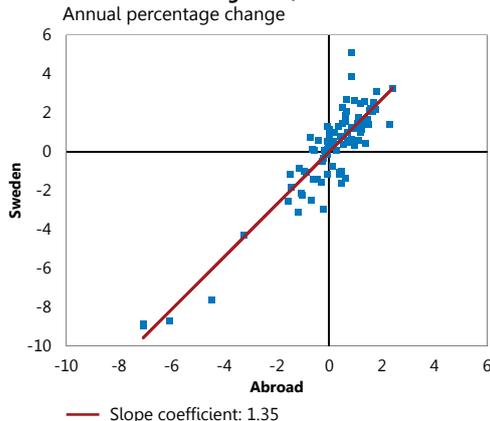
Figure 4:14. Inflation in Sweden and abroad
Annual percentage change



Note. CPIF inflation for Sweden. Correlation coefficient = 0.51. KIX refers to an aggregate of countries that are important for Sweden's international transactions.

Sources: National sources, Statistics Sweden and the Riksbank

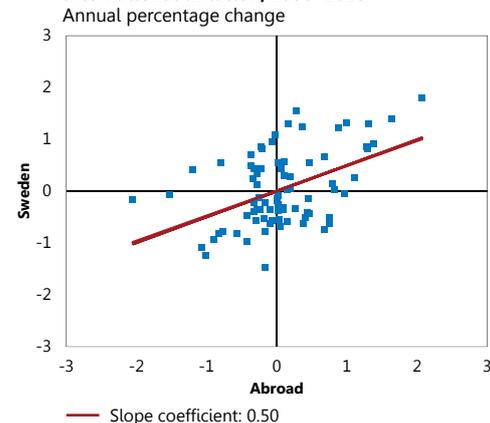
Figure 4:15. The covariation between Swedish and international GDP growth, 1995–2015



Note. International refers to KIX-weighted countries abroad. KIX refers to an aggregate of countries that are important for Sweden's international transactions. Both time series are mean value adjusted, see footnote 32.

Sources: National sources and the Riksbank

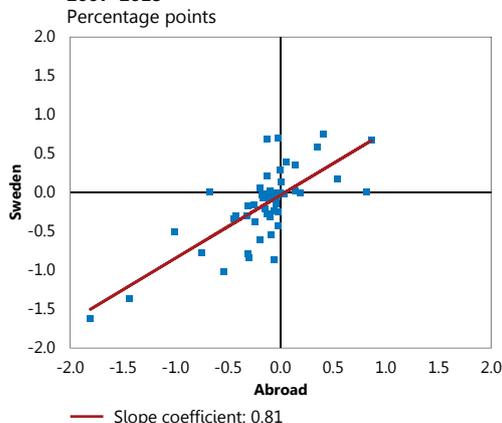
Figure 4:16. The covariation between Swedish and international inflation, 1995–2015



Note. CPIF inflation for Sweden. International refers to KIX-weighted countries abroad. KIX refers to an aggregate of countries that are important for Sweden's international transactions. Both time series are mean value adjusted, see footnote 32.

Sources: National sources and the Riksbank

Figure 4:17. Revisions to the forecast of Swedish and international GDP growth, one-year horizon, 2007–2015



Note. The forecasts refer to the first year of the forecast. International refers to TCW-weighted countries abroad up to end-2012 and thereafter to KIX-weighted countries. Both measures are an aggregate of the countries that are important for Sweden's international transactions.

Sources: National sources and the Riksbank

and the corresponding Swedish variables onto the Y axis. This is done in Figures 4:15 and 4:16 for GDP growth and inflation. The slope of the regression line through these points captures the historical pattern and measures how much the Swedish variable changes when the international variable changes by one unit.³⁴ The fact that the slope for GDP growth is 1.35 implies that variations in international growth are very important for variations in Swedish growth. The slope means that a temporary increase in GDP growth abroad by 1 percentage point usually coincides with an increase in GDP growth in Sweden of 1.35 percentage points.³⁵ The regression coefficient for inflation of around 0.5 is somewhat smaller, but it is still statistically different from 0.

Short-term forecast revisions in relation to data

In the same way as Figures 4:15 and 4:16 show the comovement between outcomes for Swedish and international variables, one can study the comovement between the Riksbank's forecast revisions for Swedish and international variables from the Monetary Policy Report (MPR) February 2007 to the MPR December 2015.³⁶ At each forecasting occasion the Riksbank makes a forecast that looks ahead at least three years. The forecast revisions are obtained by calculating the difference between the forecasts made between each Monetary Policy Report for international GDP growth and inflation and the corresponding revisions for the Swedish variables. The most recent revision is thus the change in the assessment between MPR December 2015 and MPR October 2015, the second most recent is between MPR October 2015 and MPR September 2015 and so on, all the way back to the reports published in 2007. This gives a total of 49 forecast revisions to study.³⁷

The results of this exercise are shown in Figures 4:17 and 4:18. The X axis shows the revision in international variables (average for the first year of the forecast horizon), and the Y axis shows the revision for the corresponding Swedish variable. Each point in the figure thus measures how large a revision was made for the international variable and the Swedish variable during a particular monetary policy decision-making process. On average, and over a sufficiently long period of time, these forecast revisions should reflect Sweden's international dependence, and the regression line should thus be similar to the one shown in the corresponding figure based on outcomes. If the results for GDP growth are compared (that is, the slope of the regression lines in Figures 4:15 and 4:17), the slope coefficient is 0.81 in the Riksbank's forecast revisions, which can be compared with the historical average of 1.35.

³⁴ As the Swedish and international series have different averages, the time series in Figures 4:15 and 4:16 have been mean value adjusted to be able to draw the figures with the same scale on the X and Y axis.

³⁵ The reason why the coefficient exceeds 1 is that growth in Sweden is more volatile than the weighted average of growth among our trading partners. It is thus not due to the fact that Swedish GDP growth has been somewhat higher than growth abroad during the period.

³⁶ The study includes all of the forecasts published in the Monetary Policy Report (MPR) February 2007 onwards and Monetary Policy Updates published from December 2007 and onwards. This means that the first forecast revision studies is between MPR July 2007 and MPR February 2007. The study disregards the revision in the report when the Riksbank changed over from TCW to KIX trade-weighted international variables, which took place in MPR February 2013. Finally, the study disregards the report when the Riksbank changed over from the CPIX to the CPIF, which took place in MPR July 2008.

³⁷ The forecast revisions are constructed as follows. First, a one-year forecast is calculated, that is, annual percentage change one year ahead, starting with the quarter with the most recent known outcome in Sweden. The next step involves calculating the revision by deducting the forecast in the previous Monetary Policy Report for the same period. This often entails having fewer known outcomes in the earlier forecast to compare with.

The corresponding figure for the revisions in the inflation forecasts is 0.51 in Figure 4:18, which concurs very well with the historical average in data which is 0.50 (see Figure 4:16). This thus shows that the Riksbank, according to this method, has satisfactorily taken into account changes in the forecasts of international inflation.³⁸

For Swedish GDP growth the adjustment in this period is less than the historical average in data. This could be due to several factors. Firstly, it is conceivable that the adjustment will be lower as the Riksbank uses its monetary policy to try to counteract shocks to GDP from abroad. Another explanation is that the Riksbank may have perceived the forecasts of GDP growth abroad as more uncertain than the forecasts of Swedish GDP growth and has therefore not fully taken in the revisions for international growth into the Swedish forecast. It was shown in Chapter 4 that the Riksbank made good forecasts of Swedish GDP growth in 2007–2015 compared with other analysts, but poorer forecasts of GDP growth in the euro area and the United States.

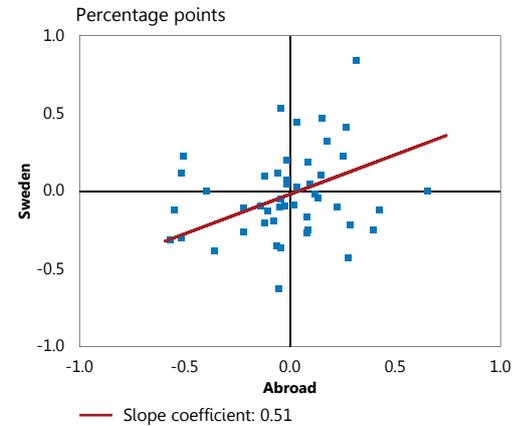
Inflation revisions in the longer run in the forecasts

The relationship between domestic and international forecast revisions in the short term was analysed above. Figure 4:19 shows the revisions for inflation in the longer run, during the third year of the forecast horizon. Figure 4:19 shows a much weaker correlation at the 3-year horizon between the forecast revisions for international and Swedish inflation compared to the relationship in the data, Figure 4:16.

Is the lower correlation in the longer run a cause for concern? No, not necessarily. Monetary policy has an impact on inflation with some time lag, which is in line with the low correlation between the forecast revisions for inflation in Sweden and abroad during the third year, compared with the first year of the forecast. A well-balanced monetary policy then means that the repo rate on average counteracts the variations in international inflation in the longer run and that CPIF inflation thus comes closer to the target at the end of the forecast horizon. But in the shorter run, it is often more difficult to counteract international inflationary impulses – such as large changes in the oil price – as effectively. The impact in the one-year horizon and the outcomes is therefore much greater than that in the third year. A strong comovement in the shorter run (Figure 4:18) and a weak comovement in the longer run (Figure 4:19) is in other words exactly what one would expect if monetary policy is well-balanced.

To summarise, it can be noted that international developments are important for Swedish economic activity and that the Riksbank has given adequate consideration to economic developments abroad when making its forecasts of developments in Sweden.

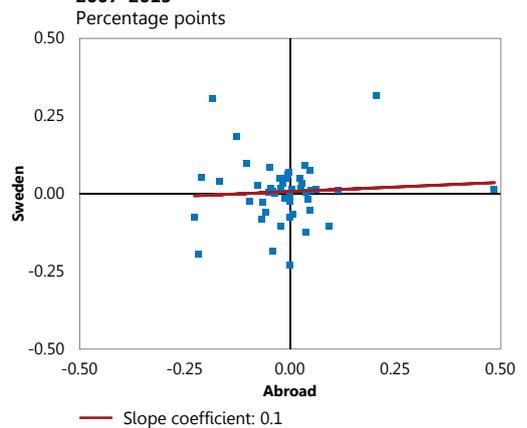
Figure 4:18. Revisions to the forecast of Swedish and international inflation, one-year horizon, 2007–2015



Note. The forecasts refer to the first year of the forecast. CPIF inflation for Sweden. International refers to TCW-weighted countries abroad up to end-2012 and thereafter to KIX-weighted countries. Both measures are an aggregate of the countries that are important for Sweden's international transactions.

Sources: National sources and the Riksbank

Figure 4:19. Revisions to the forecast of Swedish and international inflation, three-year horizon, 2007–2015



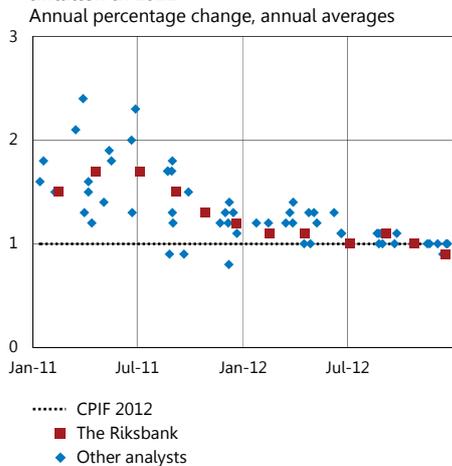
Note. The forecasts refer to the third year of the forecast. CPIF inflation for Sweden. International refers to TCW-weighted countries abroad up to end-2012 and thereafter to KIX-weighted countries. Both measures are an aggregate of the countries that are important for Sweden's international transactions.

Sources: National sources and the Riksbank

³⁸ Similar results are obtained if one studies average revisions to growth and inflation two years ahead.

Appendix

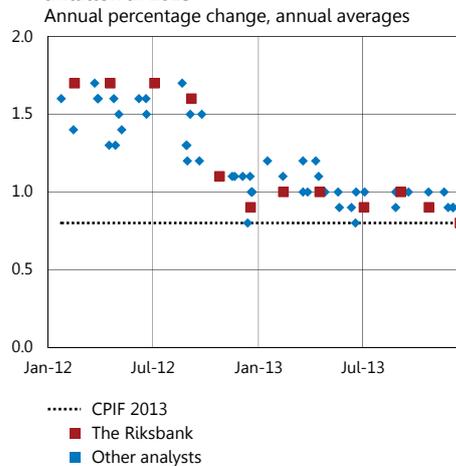
Figure A1. Forecasts 2011 and 2012 for CPIF inflation in 2012



Note. Other analysts refer to the Confederation of Swedish Enterprise, the Ministry of Finance the National Institute of Economic Research, Nordea, SEB, Svenska Handelsbanken, Swedbank and the Swedish Trade Union Confederation (LO).

Sources: Respective analysts, Statistics Sweden and the Riksbank

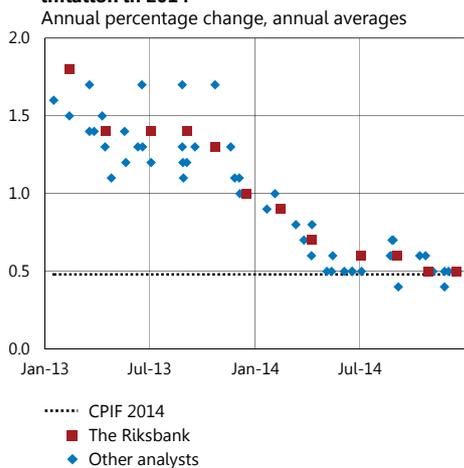
Figure A2. Forecasts 2012 and 2013 for CPIF inflation in 2013



Note. Other analysts refer to those specified in Figure A1.

Sources: Respective analysts, Statistics Sweden and the Riksbank

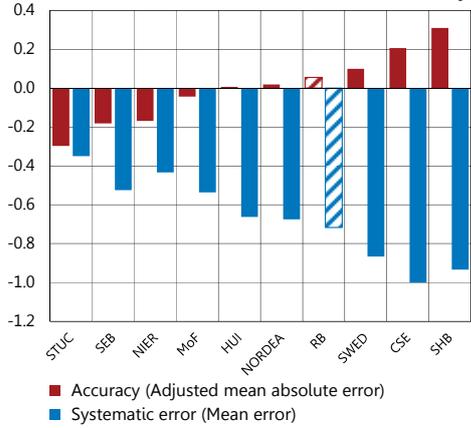
Figure A3. Forecasts 2013 and 2014 for CPIF inflation in 2014



Note. Other analysts refer to those specified in Figure A1.

Sources: Respective analysts, Statistics Sweden and the Riksbank

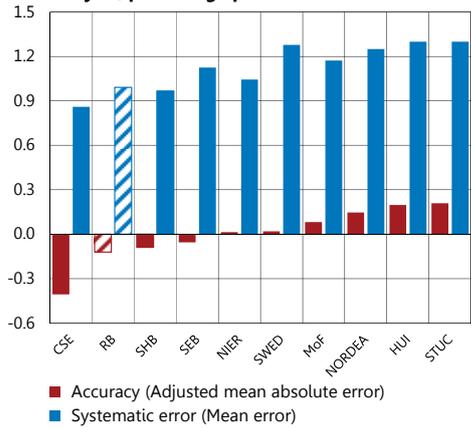
Figure A4. Accuracy and systematic errors in the forecasts for CPI inflation 2015 of various analysts



Note. CSE = The Confederation of Swedish Enterprise, HUI = HUI Research AB, MoF = Ministry of Finance, NIER = National Institute of Economic Research, RB = The Riksbank, SHB = Svenska Handelsbanken, STUC = Swedish Trade Union Confederation and SWED = Swedbank.

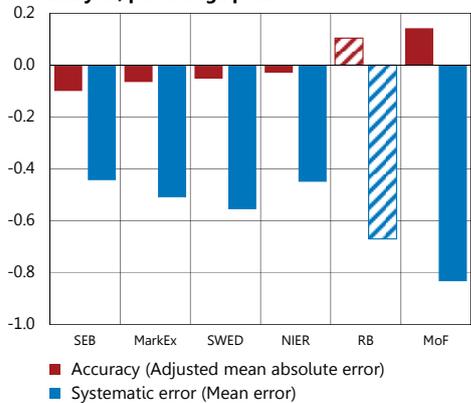
Sources: Respective analyst and the Riksbank

Figure A6. Accuracy and systematic errors in the forecasts for the GDP growth 2015 of various analysts, percentage points



Note. See Figure A4 for an explanation of the abbreviations.
Sources: Respective analyst and the Riksbank

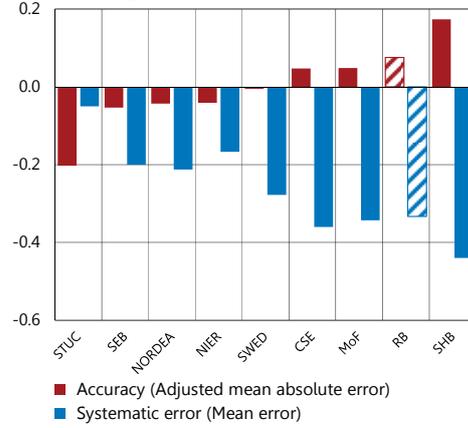
Figure A8. Accuracy and systematic errors in the forecasts for the year-end repo rate 2015 of various analysts, percentage points



Note. See Figure 4:1 for an explanation of the abbreviations. Market expectations are calculated according to market pricing of forward rates. The forward rates are calculated using derivative contracts (RIBA and FRA) adjusted for credit risk premiums. The Riksbank's quarterly forecasts have been interpolated to daily values to produce a value at the end of the year.

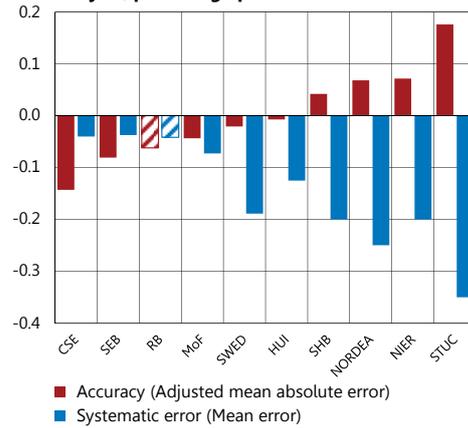
Sources: Respective analyst and the Riksbank

Figure A5. Accuracy and systematic errors in the forecasts for CPI inflation 2015 of various analysts, percentage points



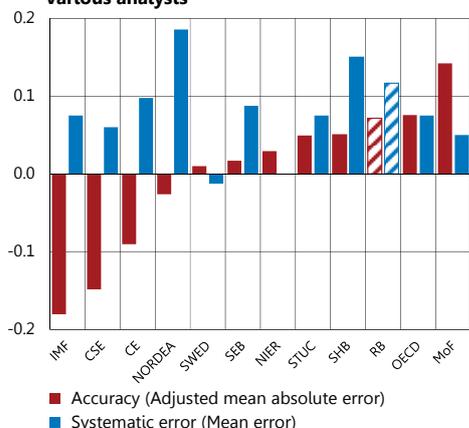
Note. See Figure A4 for an explanation of the abbreviations.
Sources: Respective analyst and the Riksbank

Figure A7. Accuracy and systematic errors in the forecasts for unemployment 2015 of various analysts, percentage points



Note. See Figure A4 for an explanation of the abbreviations.
Sources: Respective analyst and the Riksbank

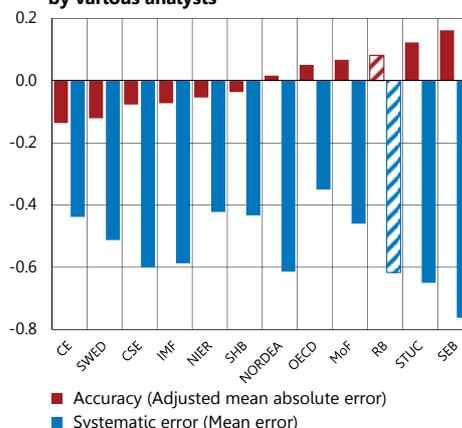
Figure A9. Accuracy and systematic errors in the forecasts for GDP growth in the euro area 2015 by various analysts



Note. CE = Consensus Economics, CSE = The Confederation of Swedish Enterprise, MoF = Ministry of Finance, NIER = National Institute of Economic Research, RB = The Riksbank, SHB = Svenska Handelsbanken, STUC = Swedish Trade Union Confederation and SWED = Swedbank.

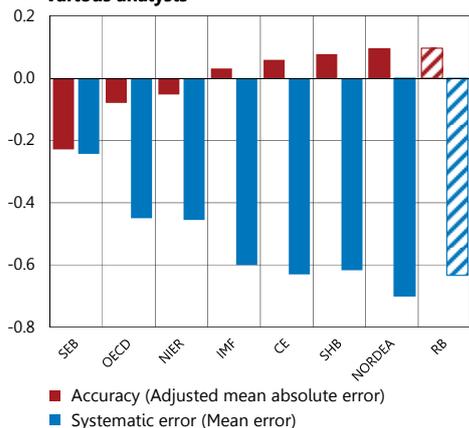
Sources: Respective analyst and the Riksbank

Figure A10. Accuracy and systematic errors in the forecasts for GDP growth in the United States 2015 by various analysts



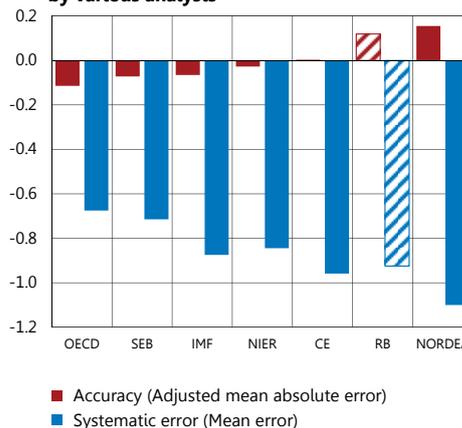
Note. See Figure A9 for an explanation of the abbreviations. Sources: Respective analyst and the Riksbank

Figure A11. Accuracy and systematic errors in the forecasts for HICP inflation in the euro area 2015 by various analysts



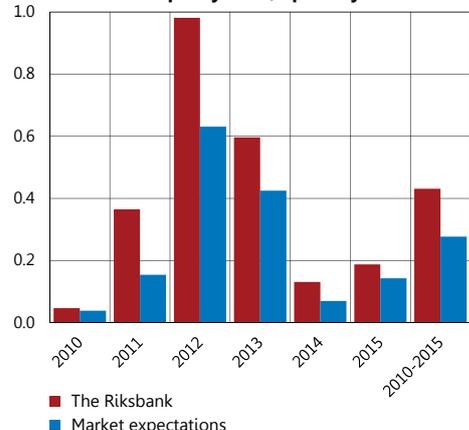
Note. See Figure A9 for an explanation of the abbreviations. Sources: Respective analyst and the Riksbank

Figure A12. Accuracy and systematic errors in the forecasts for CPI inflation in the United States 2015 by various analysts



Note. See Figure A9 for an explanation of the abbreviations. Sources: Respective analyst and the Riksbank

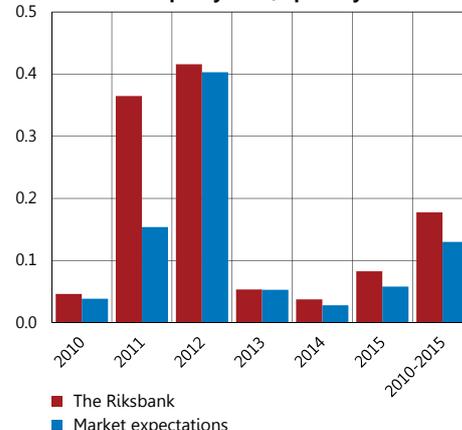
Figure A13. Accuracy in the forecasts of the international policy rates, up to 3-year horizon



Note. Mean absolute errors calculated on forecasts with up to 3-year horizon to outcome. Market expectations are calculated according to market pricing of forward rates. The forward rates are calculated using derivative contracts (RIBA and FRA) adjusted for credit risk premiums.

Source: The Riksbank

Figure A14. Accuracy in the forecasts of the international policy rates, up to 2-year horizon



Note. Mean absolute errors calculated on forecasts with up to 2-year horizon to outcome. Market expectations are calculated according to market pricing of forward rates. The forward rates are calculated using derivative contracts (RIBA and FRA) adjusted for credit risk premiums.

Source: The Riksbank

Table A1 tests the hypothesis (H0) that all analysts make equally good forecasts against the alternative hypothesis (HA) that at least one analyst makes better or poorer forecasts than the others. The table reports the so-called p-value. If the p-value is small, it is unlikely that the hypothesis (H0) that all analysts make equally good forecasts is correct. Normally, a p-value below 0.05 or 0.1 is a criterion (which comprises the so-called significance level) for rejecting H0. Table A1 shows that according to this criterion we cannot reject the hypothesis that all analysts make equally good forecasts.

Table A2 correspondingly tests the hypothesis (H0) that the Riksbank makes equally good forecasts as other analysts against the alternative hypothesis (HA) that the Riksbank makes better or poorer forecasts. This test is made against one other analyst at a time. The table shows that normally one cannot reject the hypothesis that the Riksbank in the statistical sense makes equally good forecasts as other analysts. There are some exceptions, however. The NIER, SEB, Swedbank and market expectations (in terms of forward rates) make better forecasts of the repo rate. Nordea, SEB and Consensus Economics make better forecasts of HICP inflation in the euro area. Swedbank, Consensus Economics and the IMF make better forecasts of GDP growth in the United States and SEB makes better forecasts of CPI inflation in Sweden. Finally, HUI Research AB makes poorer forecasts of Swedish GDP growth, the Ministry of Finance makes poorer forecasts of unemployment and the Confederation of Swedish Enterprise makes poorer forecasts of CPI inflation than the Riksbank does.

Tabell A1. Test of all individually-specific effects being the same (H0) or of there being differences (HA)

P-value less than significance level rejects the null hypothesis

Sweden					Euro area		USA	
GDP	Unemployment	CPI	CPIF	Repo rate	GDP	HICP	GDP	CPI
0.92	0.45	0.76	0.21	0.13	0.85	0.17	0.70	0.66

Note. The periods studied are 2007–2015 for GDP, unemployment, the CPI and the repo rate, and 2008–2015 for the CPIF. Some of the forecasts in the period 2008–2009 are for the CPIX rather than the CPIF. * denotes that the result is significant at the 10-per cent level. ** denotes that the result is significant at the 5-per cent level. The significance marking is based on non-rounded off p-values.

Source: The Riksbank

Tabell A2. Test of whether the Riksbank is as good as other forecasters (H0) or significantly better or worse than other forecasters (HA).

P-value less than significance level rejects the null hypothesis

	Sweden					Euro area		USA	
	GDP	Unemployment	CPI	CPIF	Interest	GDP	HICP	GDP	CPI
MoF	0.10	0.07*	0.20	0.44	0.15	0.30	—	0.40	—
HUI	0.10*	0.46	0.38	—	—	—	—	—	—
NIER	0.13	0.13	0.15	0.23	0.07*	0.47	0.43	0.18	0.35
STUC	0.37	0.38	0.20	0.19	—	0.12	—	0.41	—
Nordea	0.19	0.35	0.44	0.39	—	0.42	0.04**	0.18	0.15
SEB	0.44	0.16	0.05*	0.35	0.00**	0.24	0.04**	0.22	0.47
SHB	0.26	0.20	0.34	0.34	—	0.23	0.48	0.45	—
CSE	0.41	0.22	0.46	0.02**	—	0.48	—	0.42	—
SWED	0.15	0.13	0.36	0.11	0.07*	0.13	—	0.07*	—
MarkEx	—	—	—	—	0.01**	—	—	—	—
CE	—	—	—	—	—	0.19	0.04**	0.03**	0.27
IMF	—	—	—	—	—	0.34	0.32	0.05**	0.24
OECD	—	—	—	—	—	0.35	0.26	0.21	0.34

Note. See the note in Table A1. CE = Consensus Economics, MoF = Ministry of Finance, HUI = HUI Research AB, NIER = National Institute of Economic Research, SHB = Svenska Handelsbanken, CSE = the Confederation of Swedish Enterprise, STUC = Swedish Trade Union Confederation, SWED = Swedbank and MarkEx = market expectations calculated on the basis of forward rates using interest rates on derivative contracts (RIBA and FRA), adjusted for credit risk premiums.

Source: The Riksbank

Sveriges Riksbank
103 37 Stockholm

Tel +46 8 787 00 00
Fax +46 8 21 05 31
registratorn@riksbank.se
www.riksbank.se



PRODUCTION: SVERIGES RIKSBANK. PRINTING: TMG STHLM AB
ISBN 978-91-89612-90-7